



Northern Colorado Plateau Inventory and Monitoring Network Data Management Plan



Arches National Park

Black Canyon of the Gunnison National Park

Bryce Canyon National Park

Canyonlands National Park

Capitol Reef National Park

Cedar Breaks National Monument

Colorado National Monument

Curecanti National Recreation Area

Dinosaur National Monument

Fossil Butte National Monument

Golden Spike National Historic Site

Hovenweep National Monument

Natural Bridges National Monument

Pipe Spring National Monument

Timpanogos Cave National Monument

Zion National Park



The National Park Service **Inventory & Monitoring**

Northern Colorado Plateau Vital Signs Network and Prototype Cluster

Data Management Plan

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Executive Summary

Information is the common currency among the activities and staff involved in natural resource management in the National Park Service (NPS). The central mission of the National Park Service's Inventory and Monitoring (I&M) Program is to acquire, manage, analyze, and distribute scientific information on the status and trends of specific park natural resources. Intended users of this information include park managers, cooperators, researchers, and the general public.

A cornerstone of the Inventory and Monitoring Program is the strong emphasis placed on data management. All I&M networks, including the Northern Colorado Plateau Network (NCPN), expect to invest at least thirty percent of their available resources in data management, analysis, and reporting activities.

The goal of the Northern Colorado Plateau Network's data management program is to maintain, in perpetuity, the ecological data and related analyses that result from the network's resource inventory and monitoring work. The purpose of the Data Management Plan is to describe the resources and processes required to ensure the following standards for data acquired or managed by NCPN:

- *Accuracy:* The quality of the data collected and managed by the I&M Program is paramount. Analyses performed to detect ecological trends or patterns require data with minimal error and bias. Inconsistent or poor-quality data can limit the detectability of subtle changes in ecosystem patterns and processes, lead to incorrect interpretations and conclusions, and could greatly compromise the credibility and success of the I&M Program. To ensure that NCPN produces and maintains data of the highest possible quality, procedures are established to identify and minimize errors at each stage of the data lifecycle.
- *Security:* Digital and hard-copy data must be maintained in environments that protect against loss, either due to electronic failure or to poor storage conditions. NCPN digital data are stored in multiple formats on a secure server, and are part of an integrated backup routine that includes rotation to off-site storage locations. In addition, NCPN is working with NPS museum curators and archivists to ensure that related project materials such as field notes, data forms, specimens, photographs, and reports are properly cataloged, stored, and managed in archival conditions.
- *Longevity:* Countless data sets have become unusable over time either because the format is outdated (e.g., punchcards), or because metadata is insufficient to determine the data's collection methods, scope and intent, quality assurance procedures, or format. While proper storage conditions, backups, and migration of data sets to current platforms and software standards are basic components of data longevity, comprehensive data documentation is equally important. NCPN uses a suite of metadata tools to ensure that data sets are consistently documented, and in formats that conform to current federal standards.
- *Usability:* One of the most important responsibilities of the Inventory and Monitoring Program is to ensure that data collected, developed, or assembled by

NCPN staff and cooperators are made available for decision-making, research, and education. Providing well-documented data in a timely manner to park managers is especially important to the success of the program. NCPN must ensure that:

- data can be easily found and obtained
- data are subjected to full quality control before release
- data are accompanied by complete metadata
- sensitive data are identified and protected from unauthorized access and distribution

NCPN's main mechanism for distribution of the network's inventory and monitoring data will be the Internet, which will allow data and information to reach a broad community of users. As part of the NPS I&M Program, web-based applications and repositories have been developed to store a variety of park natural resource information (Table 1).

Table 1. Data that are provided on the NCPN and national I&M websites

Web Application Name	Data available at site
NPSpecies	Database of vascular plant and vertebrate species known or suspected to occur on NPS park units (NPSpecies Home Page).
NatureBib	Bibliography of park-related natural resource information (NatureBib Home Page)
NPSFocus	Portal to a variety of NPS information sources; will include NatureBib and NR/GIS Data Store links
Biodiversity Data Store	Digital archive of documents, GIS datasets and non-GIS dataset files that document the presence/absence, distribution and/or abundance of taxa in National Park Service units (Biodiversity Service Center Home Page)
NR-GIS Data Store	Park-related metadata and selected data sets (spatial and non-spatial) — (NR-GIS Metadata and Data Store Home Page)
NCPN Website	Reports and metadata for NCPN projects; certified species lists; search and reporting tools for data; data downloads; database templates (NCPN Home Page)

The Northern Colorado Plateau Network's information acquires its real value when it reaches those who can apply it. If these web portals do not meet a specific user's requirements, NCPN data management staff will work with users on an individual basis to ensure receipt of the desired information in the requested format.

Data Management Roles and Responsibilities

Data management is collaborative work that involves many persons with a broad range of expertise and abilities. All network staff have a role in data stewardship, and project data sets and products reflect all who have contributed.

Table 2 lists data-related roles and primary responsibilities, from field-based data collection, to final distribution and archiving. The fundamental role of the network data manager is to coordinate these tasks.

Table 2. Roles and primary responsibilities related to network data management.

Role	Primary responsibilities related to data management
Project crew member	Collect, record, verify data; perform data entry; organize field forms, photos, other related materials
Project crew leader	Supervise crew; communicate regularly with data manager and project leader
GIS specialist	Oversee GPS data collection; manage spatial data; prepare maps; perform spatial analyses
IT specialist	Apply database and programming skills to network projects; maintain information systems to support data management
Project leader	Direct operations, including data management requirements, for network projects
Resource specialist	Evaluate validity and utility of project data; document, analyze, publish data and associated information products
Network data manager	Ensure program data are organized, useful, compliant, safe, and available
Quantitative ecologist	Determine project objectives and sample design; perform and document data analysis and synthesis; prepare reports
Network coordinator	Coordinate and oversee all network activities
Park or regional curator	Ensure project results (documents, specimens, photographs, etc.) are cataloged and accessioned into NPS or other repositories
I&M data manager (national level)	Provide service-wide database support and services; provide data management coordination among networks
End users (managers, scientists, interpreters, public)	Inform and direct the scope of science information needs; interpret information and use to direct or support decisions

Data Sources and Priorities

There are multiple sources of significant data related to natural resources in NCPN parks. The types of work that may generate these data include:

- inventories
- monitoring
- protocol development pilot studies
- special-focus studies performed by internal staff, contractors or cooperators
- external research projects
- studies performed by other agencies on park or adjacent lands
- resource impact evaluations related to park planning and compliance
- resource management and restoration work.

Because the I&M Program focuses on natural resource inventories and long-term monitoring, NCPN's first data management priority is the data and information that results from these efforts. However, the standards, procedures, and approaches to data management developed by NCPN are being applied to other natural resource data sources.

Prioritizing data management efforts in a sea of unmanaged data

- Highest priority is to produce and curate high-quality, well-documented data originating with the Inventory and Monitoring Program
- As time and resources permit, assist with data management for current projects, legacy data, and data originating outside the Inventory and Monitoring Program that complement program objectives
- In addition, help ensure good data management practices for park-based natural resource projects that are just beginning to be developed and implemented.

For example, all natural resource parks need a basic suite of resource inventory data in order to manage their resources and support a successful monitoring program. The national Inventory and Monitoring Program has determined that a minimum of 12 inventory data sets, including both biotic and abiotic components, will be acquired by all parks. NCPN is working with individual parks and national NPS programs to acquire and standardize these basic resource data sets, and make them widely available. The data sets are:

- Natural resource bibliography
- Base cartographic data
- Geology map
- Soils map
- Weather data
- Air quality data
- Location of air quality monitoring stations
- Water body location and classification
- Water quality data
- Vegetation map
- Species distribution and status of vertebrates and vascular plants
- Documented species list of vertebrates and vascular plants

A summary of the status of these data sets for network parks is presented in Appendix J (Status of the 12 natural resource inventories, Northern Colorado Plateau Network).

Data Management Categories

Data from park and network sources can generally be placed in the following data management categories:

1. Data managed in service-wide databases.

NCPN uses three databases developed by the I&M Washington Office (WASO). NatureBib is a bibliographic tool for cataloging reports, publications, or other documents that relate to natural resources in park units. Dataset Catalog is used to document primarily non-spatial natural resource-related databases or other data assemblages (e.g., photographs, field data sheets). NPSpecies is used by the network to develop and maintain lists of vertebrates and vascular plants in network parks, along with associated supporting evidence.

2. Data developed or acquired directly by the network as a result of inventory, monitoring, or other projects, and managed by NCPN.

This category includes project-related protocols, field data, reports, spatial data, and associated materials such as field forms and photographs provided to NCPN by contractors or developed by NCPN staff. Projects can be short-term (one to three years duration) or long-term (ongoing monitoring).

3. Data that, while not developed or maintained by NCPN, are used as primary data sources or provide context to other data sets.

Examples of this category include: geographic information system (GIS) data developed by parks, other agencies or organizations; national or international taxonomic or other classification systems; climate, air quality, or hydrologic data collected or assembled by regional or national entities.

4. Data acquired and maintained by network parks that NCPN assists in managing.

Because of the lack of data management expertise in many network parks, NCPN provides data management assistance for high-priority data sets or those that may benefit from standardized procedures. Examples include: a multi-park database for rare plant data; data sets of legacy natural resource monitoring data; and data on exotic invasive plant species.

These above categories can contain one or more of the following data formats:

- hard-copy documents (e.g., reports, field notes, survey forms, maps, references, administrative documents)
- physical objects (e.g., specimens, samples, photographs, slides)
- electronic text files (e.g., Word files, email, websites)
- electronic tabular data (e.g., databases, spreadsheets, tables, delimited files)
- spatial data (e.g., shapefiles, coverages, remote-sensing data)
- miscellaneous electronic files (images, sounds, other files with proprietary formats)

Each of these data formats has specific requirements for ongoing management and maintenance, which are addressed in the Data Management Plan.

Data Management and the Project Lifecycle

Inventory and monitoring projects are typically divided into five broad stages: planning and approval; design and testing; implementation; product integration; and evaluation and closure (Figure 1). During all stages data management staff collaborate closely with project leaders and participants.

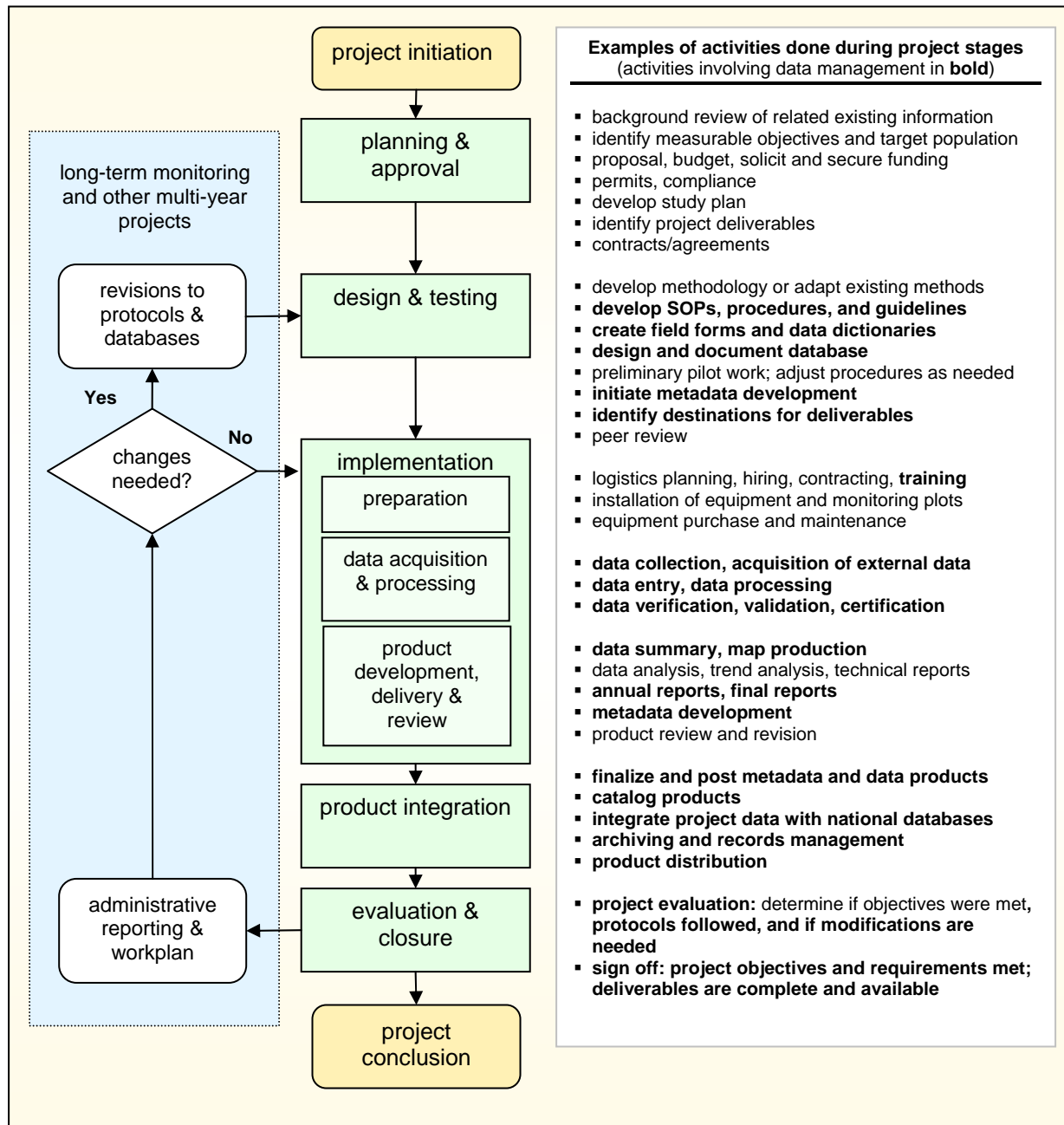


Figure 1. Model of data lifecycle stages and associated activities for the Northern Colorado Plateau Network.

Specific data management procedures corresponding to these stages are described in the chapters of the Data Management Plan. Building upon the data management framework presented in chapters 1 through 4, Chapter 5 is devoted to data acquisition and processing, and Chapter 6 provides a framework for verifying and validating data that

have been collected and entered into databases. Dataset documentation is the subject of Chapter 7, data reporting and analysis is presented in Chapter 8, and data dissemination, including issues such as data ownership and compliance with the Freedom of Information Act (FOIA), are addressed in Chapter 9. Chapter 10 provides a framework for the long-term maintenance, storage, and security of NCPN data.

Water Quality Data

The water quality component of the Natural Resource Challenge requires that networks archive all water quality data collected as part of the monitoring program in a STORET (STORage and RETrieval) database maintained by the NPS Water Resources Division (WRD). NCPN has developed an MS-Access database (NCPN H₂O) that consolidates available water quality data collected in and near the 16 NCPN park units. Associated with this database are water quality standards assessment tools that allow comparisons of historical and current data with applicable state standards. NCPN will maintain this database and integrate new data collected so it can serve as an ongoing tool for the network's long-term water quality monitoring and analysis needs.

On an annual basis NCPN will compile and format new water quality data from NCPN H₂O into an electronic data deliverable (EDD) that is compatible with WRD-STORET. WRD will ensure that content is transferred to the Environmental Protection Agency's STORET database (Figure 2).

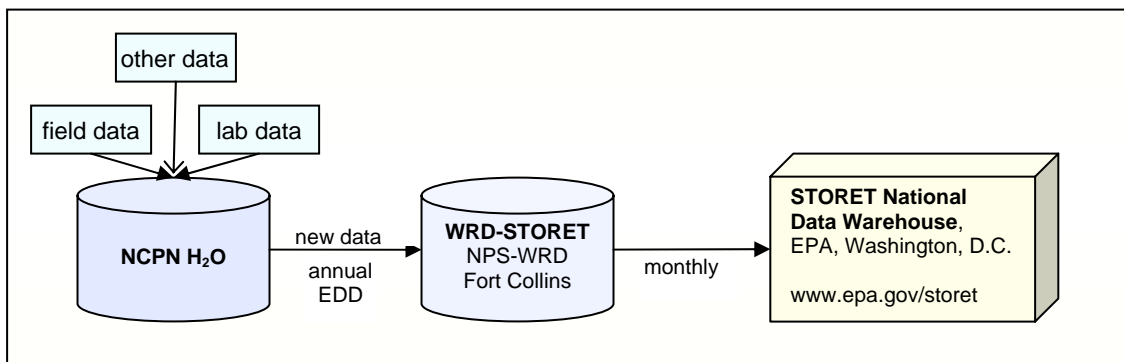


Figure 2. Simplified data flow diagram for water quality data.

Data Management Plan Maintenance

The NCPN approach is to maintain a Data Management Plan that is useful to a broad audience, and that can provide guidance on data management practices at a number of different levels. NCPN will keep the plan simple, flexible, and evolving, and include data users in the decision-making process whenever possible.

The document has undergone an initial prescribed review process that included both an internal network review (i.e., by members of the technical committee and network staff), and a service-wide review that involved the regional data/GIS coordinator, data management staff from the WASO I&M Program, and other network data managers.

NCPN will update the plan to ensure that it reflects accurately the network's current standards and practices. Recommendations for changes can be forwarded to the network data manager by any interested party or user of network inventory and monitoring data

(e.g., park resource managers, project leaders, technicians, superintendents, external users). These recommendations will be discussed by data management and network staff and actions decided upon. Simple changes can be made immediately in the document, while substantive changes will be made during version updates.

The most current version of the plan is available on the NCPN website (www.nature.nps.gov/im/units/ncpn).

CHAPTER 1. Overview of Data Management

1.1 Data Management Plan Overview

The Inventory and Monitoring Program (I&M) represents a long-term commitment by the National Park Service (NPS) to assess and document the status and trends of park ecological resources. In 1998, the National Parks Omnibus Management Act established a framework for the I&M Program, which fully integrates natural resource monitoring and other scientific activities into the management processes of the National Park system.

Information is the common currency among the various activities and staff involved in natural resource management in the National Park Service. These projects include park planning, inventories, short-term and long-term monitoring, restoration, control of invasive species, other species management, fire management, trail and road maintenance, law enforcement, and the communication of natural resource information to the public.

One of the National Park Service's primary goals is to "improve park management through greater reliance on scientific knowledge." To help meet this goal, the Northern Colorado Plateau Network (NCPN) Inventory and Monitoring Program will obtain, organize, archive, and provide high-quality natural resource data, which institutions and individuals alike can share.

The NCPN Data Management Plan is an appendix of the network's *Plan for Natural Resources Monitoring* (O'Dell et al. 2005), but is also designed to be a stand-alone document. The Data Management Plan supports the National Park Service Inventory and Monitoring Program goals and objectives by ensuring that I&M Program data are documented, secure, and accessible in perpetuity.

A distinction is usually made between the term *data*, which refers to assemblages of raw or uninterpreted facts, records, or observations, and *information*, which is created from data through the process of analysis, synthesis, modeling, or other types of interpretation. For the sake of simplicity in this plan, *data* will be used to signify both data and information.

1.2 Scope of the Data Management Plan

This data management plan outlines NCPN's approach to establishing and maintaining systems that serve the data management needs of the network, its member parks, and the national I&M program. It is intended to be a guide to current and future staff, and to ensure the continuity and documentation of data management methods and procedures through staff or organization changes.

The plan focuses on the processes used by the NCPN to:

- acquire, store, manage, and archive data
- ensure data quality
- document, analyze, summarize, and disseminate data

- ensure the long-term access to and utility of data.

The main body of the plan contains general guidelines and principles for data management, while the appendices are intended for documents that will change frequently, that are highly detailed, or that will be finalized in the months after the plan is completed.

Data management elements specific to vital signs monitoring will be addressed in detailed protocols in the network's *Plan for Natural Resources Monitoring* (O'Dell et al. 2004). Specifics for methods, frequency and timing of data acquisition and plans for the primary data management for each vital sign measure will be outlined in these protocols. Each protocol will fall under the auspices of the Data Management Plan and adhere to its strategies and guidelines.

1.3 Revisions to this plan

NCPN will regularly update and improve the Data Management Plan to ensure that it reflects accurately the network's current standards and practices. As monitoring protocols are implemented and data management procedures are further defined, chapters will be expanded upon and appendices detailing standard operating procedures (SOPs) will be added. The goal of this plan is to develop into a comprehensive operations manual for network data management.

Recommendations for changes can be forwarded to the data manager by any interested party or user of network inventory and monitoring data (e.g., park resource managers, project leaders, technicians, superintendents, external users). These recommendations will be discussed by data management and network staff and actions decided upon.

Document versions will be designated by using version numbers in parentheses that are appended to the heading of the modified section. For example, the first version of a section in Chapter 4 would have the heading "4.1." A revision to this section would have the heading "Chapter 4. (v2)." Appendix A of the plan (Data Management Plan revision history log) contains an update schedule and key that will identify and summarize changes. Previous versions will be archived in their entirety for reference.

The latest version of the plan will be available on the NCPN website (<http://www1.nature.nps.gov/im/units/ncpn/>) and will include the revision log as an attachment.

1.3.1 Peer Review Process

This document will undergo a prescribed review process that will include both an internal network review (i.e., by members of the technical committee and network staff), and a service-wide review that involves the regional data/GIS coordinator and data management staff from the NPS Washington Service Office (WASO) I&M Program. External reviewers from other agencies will also be sought to provide a more balanced and comprehensive review of this plan.

1.4 Types of Data Covered by This Plan

Data must be accompanied by sufficient context about how and why they were collected if they are to maintain their long-term value. A data management program cannot simply attend to the resulting tables, fields, and values that make up a data set; there must also be a process for developing, preserving, and integrating the context that makes the data usable. To maintain this context, this plan encompasses a range of products that are coordinated or managed by NCPN or under its auspices. These products fall into five general categories: raw data, derived data, documentation, reports, and administrative records (Table 1-1).

Table 1-1. Categories of data products and project deliverables

Category	Examples
Raw data	GPS files, raw field forms and notebooks, photographs and sound/video recordings, telemetry or remote-sensed data files, biological voucher specimens
Compiled/derived data	Relational databases, tabular data files, GIS layers, maps, species checklists, output files
Documentation	Data collection protocols, data processing/analysis protocols, record of protocol changes, data dictionary, FGDC/NBII metadata, data design documentation, quality assurance report, catalog of specimens/photographs
Reports	Annual progress report, final report (technical or general audience), periodic trend analysis report, publication
Administrative records	Contracts and agreements, study plan, research permit/application, other critical administrative correspondence

1.5 Data Sources

There are many potential sources of natural resource-related data pertaining to network parks. The types of work that may generate these data include:

- Inventories
- Monitoring
- Protocol development pilot studies
- Special-focus studies done by internal staff, contractors, or cooperators
- External research projects
- Research conducted by other agencies on park or adjacent lands
- Resource evaluations related to park planning and compliance
- Resource management and restoration work

Considering the volume of data that has been produced in 16 parks, priorities must be set for network data management efforts. As a general rule these are:

- Produce and curate high-quality, well-documented data originating with the Inventory and Monitoring Program.
- Assist with data management for current projects, legacy data, and data originating outside the Inventory and Monitoring Program that complement program objectives

- Help ensure good data management practices for park-based natural resource projects that are just beginning to be developed and implemented.

1.6 Data Management Goals

As the basic and most important products of scientific research, data and information represent a valuable and often irreplaceable resource (Michener and Brunt 2000). For long-term ecological monitoring programs such as the NCPN Inventory and Monitoring Program, retention and documentation of high-quality data are the foundation upon which the success of the overall program rests.

The NCPN approach to data management focuses on being user-oriented, with the realization that data users range from park biologists, to natural resource managers, to the general public. In addition, the results of NCPN research will be widely shared with the scientific community.

The overarching goals of NCPN data management are:

- ensure the highest quality and accuracy of program data
- maintain data in an environment that ensures against loss
- ensure the longevity of data by keeping data formats standardized and current
- fully qualify, document, and catalog all data to ensure their proper interpretation and use
- provide data in a variety of formats and venues to reach all potential users

1.7 Network and Prototype Organization and Management

The Northern Colorado Plateau Network provides a framework for conducting biological inventory and monitoring within 16 park units in the northern Colorado Plateau (Table 1-2, Figure 1-1).

Table 1-2. National Park Service Units within the Northern Colorado Plateau Network and Prototype with state, hectares and acres. (Prototype parks are denoted by an asterisk).

Park Name	Park Code	State	Hectares	Acres
Arches National Park *	ARCH	UT	30,966	76,519
Black Canyon of the Gunnison National Park	BLCA	CO	12,239	30,244
Bryce Canyon National Park	BRCA	UT	14,502	35,835
Canyonlands National Park *	CANY	UT	136,610	337,570
Capitol Reef National Park *	CARE	UT	97,895	241,904
Cedar Breaks National Monument	CEBR	UT	2,491	6,155
Colorado National Monument	COLM	CO	8,310	20,534
Curecanti National Recreation Area	CURE	CO	17,433	43,078
Dinosaur National Monument *	DINO	CO/UT	85,097	210,278
Fossil Butte National Monument	FOBU	WY	3,318	8,198
Golden Spike National Historic Site	GOSP	UT	1,107	2,735

Park Name	Park Code	State	Hectares	Acres
Hovenweep National Monument	HOVE	UT/CO	318	785
Natural Bridges National Monument *	NABR	UT	3,009	7,435
Pipe Spring National Monument	PISP	AZ	16	40
Timpanogos Cave National Monument	TICA	UT	101	250
Zion National Park	ZION	UT	59,900	148,016
Total Network Area			473,312	1,169,576

Additionally, five park units within the network comprise the Northern Colorado Plateau Prototype Cluster: CANY, ARCH, NABR, CARE, and DINO, representing the Arid Lands association. Although prototype and network planning are being woven together in a coordinated approach, NCPN has chosen to focus on the concept of the prototype as a *center of excellence*, providing an opportunity to focus on research and development of monitoring protocols that have utility across the rest of the network.

NCPN's main office is co-located with the NPS Southeast Utah Group (SEUG) in Moab, Utah, which is the administrative office for four network parks (ARCH, CANY, HOVE, and NABR). In addition, the Moab office complex houses the Canyonlands Field Station of the USGS-Biological Research Division. NCPN also has a satellite office at the Colorado National Monument in Fruita, Colorado (approximately 100 miles from Moab).

1.7.1 Staff

NCPN staff composition will change as the program moves more fully into the monitoring phase. Table 1-3 lists the network staff positions at the time this plan was completed. Roles and responsibilities of each are more fully explained in Chapter 2.

Table 1-3. NCPN staff positions as of September, 2005.

Position	Responsibilities	Location
Program Coordinator	program direction and management	SEUG
Quantitative Ecologist	acquisition and analysis of remotely-sensed data; status and trend analyses	SEUG
Vegetation Program Manager	vegetation mapping, vascular plant lists, invasive plant monitoring	SEUG
Hydrologist	plan and coordinate hydrology data collection; ensure processing of new data and integration with network, NPS, and national data systems	BRCA
Data Manager	coordinate data management activities	vacant
Administrative Clerk	payroll, budget, travel, staff administrative support	SEUG
GIS Specialist	acquisition, management, maintenance of spatial data	SEUG
Biologist	oversight of inventories; NPSpecies management	SEUG
Biological Technician	data mining; maintenance of NatureBib, Dataset Catalog, photo database	COLM

Position	Responsibilities	Location
Biological Technician (2)	assistance with vegetation program, data compilation, data entry, quality control	SEUG
IT Specialist	website development, database design, creation and maintenance	COLM

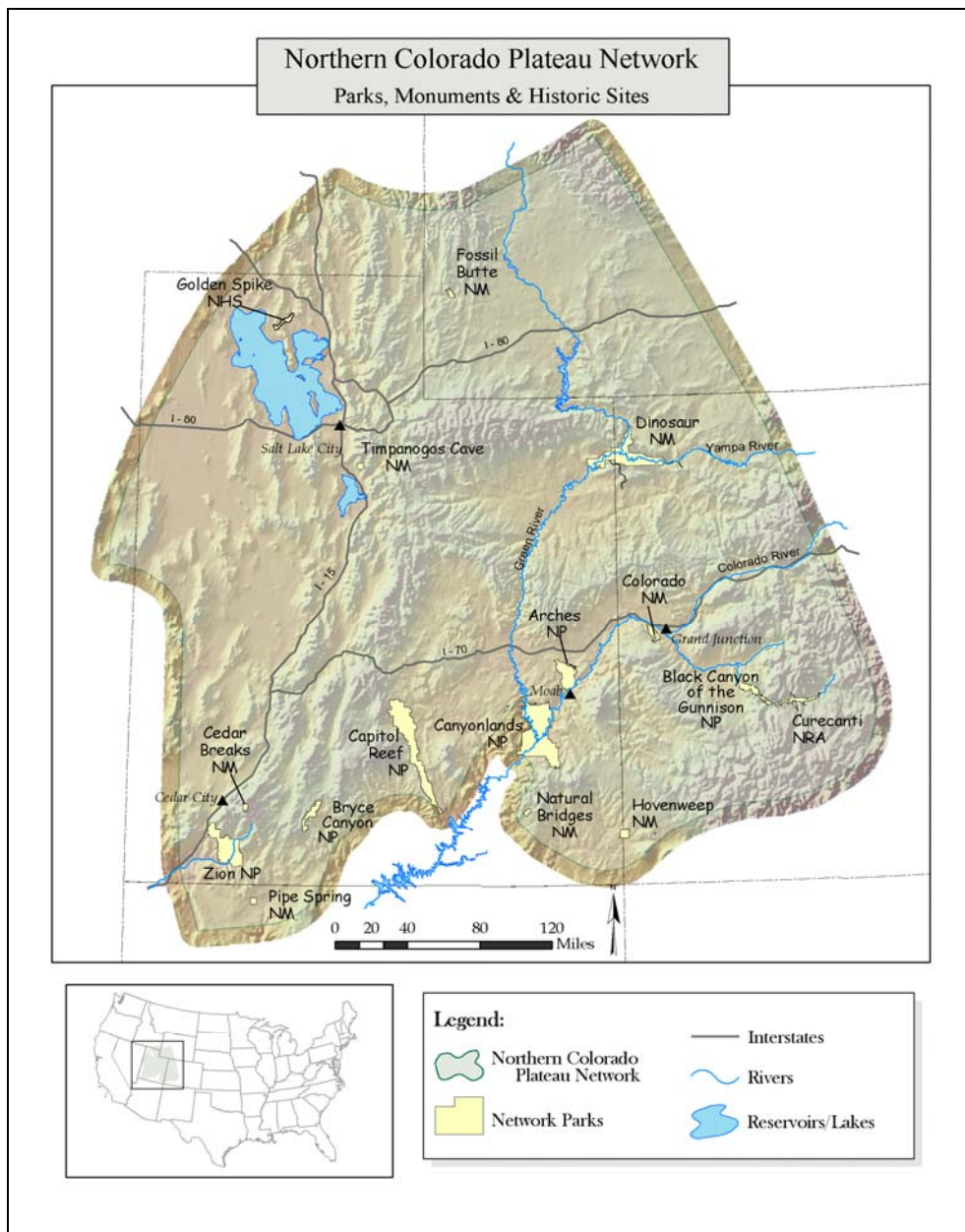


Figure 1-1. Northern Colorado Plateau Network park units

CHAPTER 2. Data Management Roles and Responsibilities

Data management is collaborative work that involves many people with a broad range of expertise and abilities. All network staff have a role in data stewardship, and project data sets and products reflect all who have contributed. This chapter clarifies roles and outlines the principal and ancillary data management responsibilities of network staff, cooperators, and other project participants.

2.1 Project-related Roles and Responsibilities

For the Northern Colorado Plateau Network (NCPN) to work effectively, staff need to understand their responsibilities in the production, analysis, management, and end use of program data. One way of illustrating these responsibilities is to put them in the context of a project's life cycle. Table 2-1 summarizes the principal data stewardship roles of project personnel. All positions contribute to and overlap with other categories.

Table 2-1. Data stewardship responsibilities in the context of a project life cycle.

Project Stage	General Description	Principal Responsibility
Design and testing	<ul style="list-style-type: none">▪ Develop methodology or adapt existing methods▪ Establish data collection protocols▪ Establish project schedule▪ Design and test database▪ Design data sheets	Project Leader Quantitative Ecologist Data Manager GIS Specialist
Implementation	<ul style="list-style-type: none">▪ Record locations, measurements and observations in the field▪ Digitize source maps▪ Key in data from a hardcopy source, convert existing data sources▪ Process images▪ Prepare summary tables, maps, reports	Project Crew Member Project Crew Leader GIS Specialist Data Manager
Analysis and reporting	<ul style="list-style-type: none">▪ Use data to address monitoring objectives, specifically, status and trends of vital signs▪ Use data to describe and interpret relationships among vital signs▪ Synthesize data for different types of end users▪ Prepare periodic and final reports	Project Leader Quantitative Ecologist

Project Stage	General Description	Principal Responsibility
Integration	<ul style="list-style-type: none"> ▪ Apply procedures that keep data organized and usable; make data available ▪ Document project and data ▪ Archive data and products ▪ Catalog data and products ▪ Publish results ▪ Post on Internet 	Project Leader Data Manager GIS Specialist Museum Curator Quantitative Ecologist IT Specialist
Evaluation	<ul style="list-style-type: none"> ▪ Evaluate if project meets objectives ▪ Determine changes to methods, procedures, or data design 	Project Leader Data Manager GIS Specialist Quantitative Ecologist

Table 2-2 further itemizes data management roles and specific responsibilities as they relate to specific staff positions, from the initial collection of data, to final reporting, archiving, and end use.

Table 2-2. Summary of data management roles and responsibilities

Position	Primary responsibilities related to data management
Project Crew Member	<ul style="list-style-type: none"> ▪ Collect, record, and verify measurements and observations based on project objectives ▪ Document methods, procedures and anomalies. ▪ Provide global positioning system (GPS) data to geographic information system (GIS) specialist ▪ Perform data entry ▪ Organize data sheets, photos, other related materials
Project Crew Leader	<ul style="list-style-type: none"> ▪ Supervise crew members to ensure their data collection, data entry, and management obligations are met, including data verification and documentation ▪ Communicate regularly with data manager and project leader
GIS Specialist	<ul style="list-style-type: none"> ▪ Oversee preparation of GPS units and data dictionaries; conduct GPS training ▪ Perform GIS activities, including data entry, data conversion, and documentation ▪ Work on overall data quality and stewardship with project leaders, resource specialists, and the network data manager ▪ Coordinate and integrate local GIS data management with network, regional, and national standards and guidelines ▪ Prepare maps and perform spatial analyses ▪ Perform QA/QC on spatial datasets created ▪ Ensure FGDC-compliant metadata is completed for all spatial data

Position	Primary responsibilities related to data management
Information Technology Specialist	<ul style="list-style-type: none"> ▪ Provide and maintain information systems foundation to support data management. ▪ Apply specific database and programming skills to network applications
Project Leader	<ul style="list-style-type: none"> ▪ Oversee and direct operations, including data management requirements, for one or more network projects ▪ Maintain communication with project staff, network data manager, and resource specialist regarding data management ▪ Ensure project documentation and metadata is complete and current <p>Note: The project leader is often a resource specialist, in which case the associated responsibilities for data authority apply (see next role). A project leader without the required background to act as an authority for the data will consult with and involve the appropriate resource specialists.</p>
Resource Specialist	<ul style="list-style-type: none"> ▪ Understand the objectives of the project, the resulting data, and its scientific and management relevance ▪ Make decisions about data with regard to validity, utility, sensitivity, and availability ▪ Document, describe, publish, release, and discuss the data and associated information products <p>Note: The resource specialist serving as a project leader is also responsible for the duties listed with that role</p>
Network Data Manager	<ul style="list-style-type: none"> ▪ Understand and determine program and project data management requirements ▪ Create and maintain data management hardware/software infrastructure and standards ▪ Provide overall network support for the coordination and integration of data management activities ▪ Coordinate and review metadata for all projects and products ▪ Serve as Point of Contact for National Park Service (NPS) database applications ▪ Coordinate internal and external data management activities ▪ Extract data from databases in formats needed by users
Quantitative Ecologist	<ul style="list-style-type: none"> ▪ Ensure useful data are collected and managed by integrating natural resource science in network activities and products ▪ Determine project objectives and sample design; perform and document data analysis and synthesis; prepare reports
Network Coordinator	<ul style="list-style-type: none"> ▪ Ensure programmatic data and information management requirements are met as part of overall network business
Park or Regional Curator	<ul style="list-style-type: none"> ▪ Ensure project results (documents, specimens, photographs, etc.) are cataloged accessioned into NPS or other federal repositories

Position	Primary responsibilities related to data management
I&M Data Manager (National Level)	<ul style="list-style-type: none"> ▪ Provide service-wide database support and services ▪ Provide data management coordination among networks
End Users	<ul style="list-style-type: none"> ▪ End users include park managers and superintendents, researchers, staff from other agencies, and the general public. Responsible for appropriate use and application of data and for providing feedback for improvements

Data documentation is the one shared responsibility that stands above the rest. The careful description of data sets, data sources, and methodologies establish the basis for data use, analysis and end products, both in the short term and long term. Additional guidance and specific information on data documentation is provided in Chapter 7.

2.2 Core Data Management Team

The project leader, data manager, and GIS specialist comprise the core data management team for inventory and monitoring projects. Each is responsible for certain aspects of project data, and all share responsibility for some overlapping tasks (Figure 2-1). Because of the collaborative nature of project data management, communication among these positions is essential to meeting program goals.

2.2.1 Project Leader

Each inventory project and each vital sign selected for monitoring by NCPN has a designated project leader. The project leader is responsible for the coordination and supervision of all phases of a project, from initiation to final archiving, and is the primary point of contact for a project. The project leader is actively involved in all aspects of project data management in order to ensure the quality and long-term usefulness of project data. Specifically, the role of the project leader includes:

- Develop, document and implement standard procedures for field data collection and data handling.
- Enact and supervise quality assurance and quality control measures for the project.
- Supervise and certify all field operations, including staff training, equipment calibration, species identification, and data collection. Supervise or perform data entry, verification and validation.
- Maintain concise explanatory documentation of all deviations from standard procedures.
- Ensure documentation of important details of each field data collection period.
- Maintain hard copies of data forms and assemble original data forms for archiving on a regular basis.
- Work with program coordinators to identify analysis and reporting mechanisms, and to establish a schedule for regular project milestones such as data collection periods, data processing target dates, and reporting deadlines.
- Produce regular summary reports and conduct periodic trend analysis of data, store the resulting reports, and make them available to users.

- Act as the main point of contact concerning data content.

The project leader works closely with the data manager to:

- Develop quality assurance and quality control procedures specific to project operations.
- Identify training needs for staff related to data management philosophy, database software use, quality control procedures, etc.
- Coordinate changes to the field data forms and the user interface for the project database.
- Fully document and maintain master data.
- Identify sensitive information that requires special consideration before distribution.
- Manage the archival process to ensure regular archiving of project documentation, original field data, databases, reports and summaries, and other products from the project.
- Create data export and summary procedures to automate and standardize data products needed for secondary use or analysis.
- Identify priority legacy data sets and convert to current formats.
- Complete project documentation describing the who, what, where, when, why and how of a project.
- Increase the interpretability and accessibility of project-related products.

2.2.2 Data Manager

In general terms, the data manager is responsible for the development, implementation, and maintenance of the network's data infrastructure and standards. The data manager oversees the flow of data into the program, their proper organization and maintenance, their dissemination to end users, and their long-term security and accessibility.

The data manager is responsible for ensuring the compatibility of project data with program standards, for designing the infrastructure for the project data, and for ensuring long-term data integrity, security, and availability. The role includes the following tasks:

- Develop and maintain the infrastructure for metadata creation, project documentation, and project data management.
- Create and maintain project databases in accordance with best practices and current program standards.
- Provide training in the theory and practice of data management, tailored to the needs of project personnel.
- Develop ways to improve the accessibility and lucidity of digital data.
- Establish and implement procedures to protect sensitive data according to project needs.
- Collaborate with GIS specialists to integrate tabular data with geospatial data in a system that meets project objectives.

Data managers will also work closely with the project leader to:

- Define the scope of the project data and create a data structure that meets project needs.
- Become familiar with how the data are collected, handled and used.
- Review quality control and quality assurance aspects of project protocols and procedures
- Identify elements that can be built into the database structure to facilitate quality control, such as required fields, domains, pick lists, and validation rules.
- Create a user interface that streamlines the process of data entry, review, validation, and reporting, and that is consistent with the capabilities of the project staff.
- Perform retrievals and summaries of data in formats that are required for data analysis.
- Ensure that project documentation is complete, complies with metadata requirements, and supports the interpretability and longevity of the project data.
- Ensure regular archiving of project materials.
- Inform project staff of changes and advances in data management practices.

In addition to project-related duties, the data manager:

- Coordinates and oversees data documentation and population of NPSpecies, NatureBib, and Dataset Catalog.
- Provides data management advice and guidance to network parks.
- Conducts data management training and orientation sessions to network parks and others.
- Contributes to regional and national discussions regarding data management; represents NCPN and the Inventory and Monitoring (I&M) Program at meetings and conferences.
- Specifies and orders computer and peripherals for the program and staff; acts as liaison between NCPN and Southeast Utah Group (SEUG) system administrators; provides overall computer support to staff.

2.2.3 GIS Specialist

Almost all of the data acquired or managed by NCPN have a related spatial component. The network GIS specialist provides fundamental program and project support by acquiring and maintaining geospatial data, performing spatial analyses, and documenting all spatial data sets. The GIS specialist also has an essential communication role in the network: maps and graphic spatial analyses are one of the principal means of conveying complex geographic or quantitative data to wide audiences. The GIS specialist obtains, creates, and manages spatial data themes associated with network inventory and monitoring projects, as well as other spatial data related to the full range of park resources. The GIS specialist works in collaboration with the project leader to:

- Determine the GIS data and analysis needs for the project.
- Develop procedures for field collection of spatial data including the use of GPS and other spatial data collection techniques.

- Perform QA/QC of spatial datasets created
- Conduct spatial analyses of project and related data.
- Create maps and other means of displaying spatial data to meet project objectives.
- Document data in compliance with spatial metadata standards.

The GIS specialist also works directly with the data managers to:

- Design databases and other applications for the network.
- Create relationships between GIS and non-spatial data and create applications for their analysis.
- Establish and implement procedures to protect sensitive spatial data according to project needs.
- Develop and maintain an infrastructure for metadata creation and maintenance.
- Ensure that project metadata are created and comply with national and agency standards.

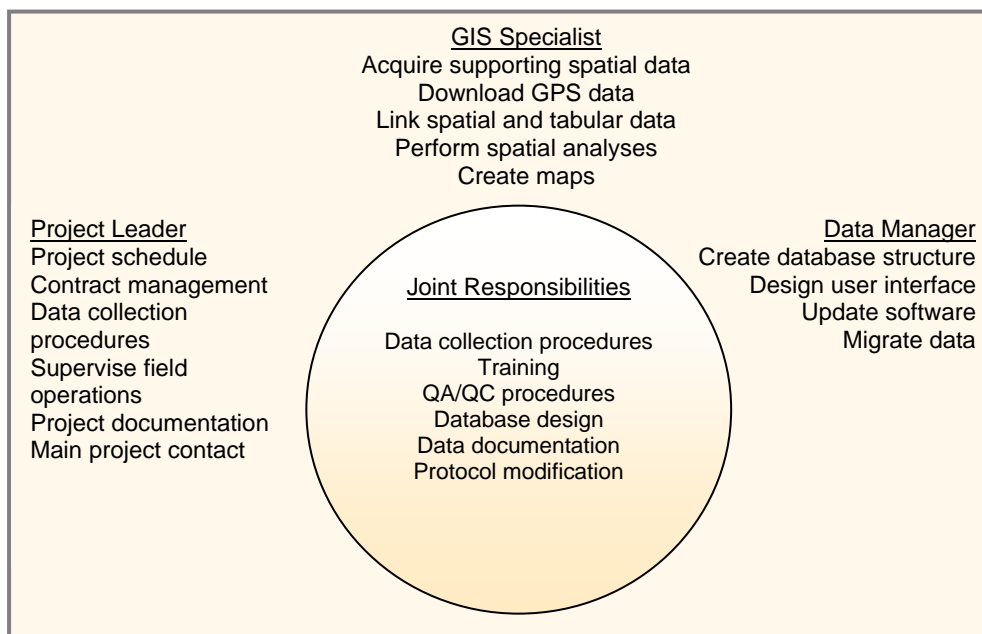


Figure 2-1. Overlap of project responsibilities of the core data management team

2.3 Data Management Coordination

The Northern Colorado Plateau Network benefits from data coordination and collaboration at all organization levels within the National Park Service.

At a national level, the I&M Program has designed and built data tools such as NPSpecies, Dataset Catalog, NatureBib, and the Natural Resource Database Template, which are used by all networks across the country. Providing networks with a common starting point has helped ensure a level of consistency and compatibility despite the many variables in the networks. NCPN has taken an active role in the development of these

tools, and provides regular feedback and suggestions on how to make them better for all users.

I&M network data managers across the country collaborate frequently on questions and issues. A data management listserve provides a forum for soliciting ideas and discussing them; a data management site on the NPS Intranet allows files to be easily shared. Regional and annual I&M conferences frequently have sessions devoted to data management, and emails are exchanged frequently. Network data management plans are evolving and improving through ongoing cooperation and sharing of material.

NCPN maintains an active role in promoting consistency among protocols and data sets involving other networks. Cooperative projects are being conducted with the Southern Colorado Plateau Network, and the long-range goal is to align shared vital signs and schedules between the networks. Protocols and related databases and analyses developed by the network will be made available to all networks via the web-based Monitoring Protocols Clearinghouse (<http://science.nature.nps.gov/im/monitor/protocoldb.cfm>).

Finally, direct involvement by park-based scientists, resource managers, and staff is essential to the long-term success of the Inventory and Monitoring Program. The guidance, assistance, and information provided by the parks are fundamental to the network's inventory work, and monitoring planning, implementation, and application.

2.3.1 Data Management Assistance to Parks

NCPN works as an advocate for better park-based data management, and hopes to set an example of the benefits of well-managed data. Data mining efforts at parks have helped uncover and organize data sources, and tools such as NatureBib, Dataset Catalog, and NPSpecies will help parks find, apply, and disseminate their natural resource-related information more easily and efficiently. Whenever possible, network data management staff help answer data management-related questions from parks, and assist with database design.

GIS Assistance

Only two park offices, Zion and the Southeast Utah Group, have dedicated GIS staff. The parks within NCPN vary widely in their resource management-related GIS capabilities, which are summarized in Table 2-3. NCPN provides, to the extent possible, GIS support to those parks that lack the skills or tools to effectively take advantage of this essential technology.

Table 2-3. Summary of GIS capabilities in NCPN parks as of September, 2005. Fire-related GIS programs are not included.

Park	Park GIS Personnel	GIS Users (limited use)	Primary Software	Comments
ARCH CANY HOVE NABR	1 dedicated staff position, GS-12	5 - 8 users	ArcGIS 9.1	Additional GIS users from USGS office

Park	Park GIS Personnel	GIS Users (limited use)	Primary Software	Comments
BLCA CURE	0 dedicated staff, GS-11 position lapsed since 2003.	5 - 8 users	ArcView 3.x	Position temporarily filled with an Acting GIS staff from a park project
BRCA	0 dedicated staff, position vacant since 2001.	1 - 2 users	ArcGIS 9.0	No one uses GIS except fire personnel and SCAs
CARE	0 dedicated staff, position vacant since 1998.	2 - 3 users	ArcGIS 9.1	Current park biologist has some GIS responsibility
COLM	0 dedicated staff, position vacant since 2003.	1 - 3 users	ArcGIS 9.1	
DINO	0 dedicated staff, position vacant since 2002.	1 - 2 users	ArcView 3.x	Previous GIS position was combined IT / GIS
FOBU	0 dedicated staff	1 - 2 users	ArcView 3.x	
GOSP	0 dedicated staff	0 users	none	
TICA	0 dedicated staff	1 - 2 users	ArcGIS 9.1	
ZION CEBR PISP	2 dedicated GIS positions, 1 full time GS-12, 1 term subject to furlough GS-7	4 - 9 users	ArcGIS 9.1 (UNIX, workstation only)	GIS positions are Resource Management, but very involved with fire.

The variability of skills and software versions among network parks increases the difficulty of efficiently distributing newly-created or collected data to the parks, as multiple formats usually need to be created and maintained (i.e., coverages, shapefiles, and geodatabases). An NCPN data managements goal is to use the Enterprise License Agreement between NPS and Environmental Systems Research Institute (the developer of ArcGIS software) to upgrade the software to ArcGIS at all parks that do not have dedicated GIS staff. NCPN will also promote and coordinate, as possible, GIS training for park staff.

Credits

Sections 2.1 and 2.2 were adapted from material prepared by Rob Daley (Greater Yellowstone Network).

CHAPTER 3. Data Management Infrastructure and System Architecture

The Northern Colorado Plateau Network (NCPN) data infrastructure is composed of a networked system of computers and servers, which is the foundation upon which the information system is built. System architecture refers to the applications, database systems, repositories, and software tools that make up the framework of NCPN's data management enterprise. This chapter describes the NCPN infrastructure in general terms, and focuses more specifically on the system architecture that is central to data management.

NCPN relies heavily on park, regional, and national information technology (IT) personnel and resources to maintain its computer infrastructure. This includes, but is not limited to: hardware replacement; software installation and support; email administration; security updates; virus-protection; telecommunications; networking; and backups of servers. Communication with park and regional IT specialists is essential to ensure the growth, stability, and security of the infrastructure.

3.1 Computer Infrastructure

The NCPN computer infrastructure has four main components: servers maintained at the national level; park-based local area networks (LANs); an NCPN data server; and individual staff workstations. These components each host different parts of the National Park Service (NPS) and NCPN information systems. The infrastructure is maintained by park, regional, and national IT specialists, who administer all aspects of system security and backups.

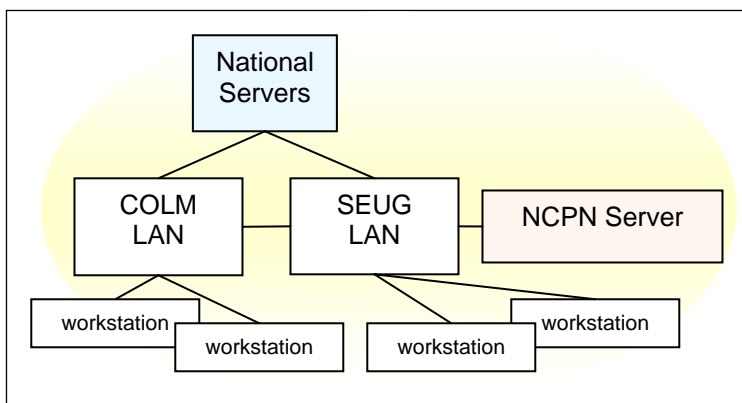


Figure 3-1. Schematic representing the logical layout and connectivity of NCPN computer infrastructure.

3.1.1 National Servers

National servers provide both secure (NPS only) and public workspaces that are accessible via the Internet. Inventory and Monitoring (I&M) networks use them for:

- Master applications — integrated client-server versions of NatureBib, NPSpecies, NR-GIS Metadata Database

- Centralized repositories — NR-GIS Data Store, Monitoring Protocol Clearinghouse
- Public access sites — portals to NatureBib, NPSpecies, NPSFocus, and I&M network websites.

3.1.2 Park LANs (SEUG and Colorado National Monument)

Park local area networks provide shared workspace for park and network staff, and also provide each staff member with dedicated workspace that is part of a regular backup routine.

3.1.3 Network data server

NCPN has acquired a 750GB server, which is part of the Southeast Utah Group (SEUG) LAN. The server is used for storing:

- Network administrative files
- Active databases: data sets and related files for inventory, monitoring, and other network projects
- Common lookup tables
- Central databases that are linked to individual project databases
- Network archive — a repository for finished project data and deliverables, raw data archives, interim version archives, digital photographs
- Network and SEUG GIS files — base spatial data, imagery, network project data. Because the NCPN GIS office is co-located with the SEUG GIS, spatial data are a shared resource.

3.1.4 Local workstations

Network staff manage files on their personal computers, and place files that need to be shared on the NCPN server. Staff are responsible for regularly copying their workstation files to workspace on the park LAN for backup.

3.2 NCPN System Architecture

Rather than developing a single, integrated database system, NCPN data design is based upon modular, standalone project databases that share design standards and links to centralized data tables. Individual project databases are developed, maintained, and archived separately. Advantages to this strategy include:

- Individual project databases and protocols can be developed at different rates
- A project database can be modified without affecting the functionality of other project databases.

3.2.1 Project Database Standards

Project database standards are necessary for ensuring compatibility among data sets, which is vital given the various ways in which data sets may be aggregated and summarized. Well-thought-out standards also encourage sound database design. Databases that are developed for park and network projects will contain the following main components:

- *Standardized database object naming* — objects such as tables, fields, queries, forms, and reports will be named according to conventions adopted for the I&M Natural

Resource Database Template. The conventions are presented in Appendix F (Database naming conventions).

- *Links to central databases* – Links to data tables that reside in central databases prevent storing redundant information in multiple project databases. These tables typically contain information that is complex to maintain and is applicable to many projects. Examples include: Master Version Tables for vital signs projects; network-wide species and vegetation data; data user logs; and data edit logs.
- *Use of standardized look-up tables* — Many data tables are used repeatedly in project databases. Standardized versions of these tables are stored at a central location so they can be easily copied in or linked to project databases. For performance reasons, storing these simple and static tables directly in a project database may be more efficient than linking.
- *Core tables and fields based on network and national templates* – These tables and fields are used to manage the information describing the “who, where and when” of project data. These core tables contain data fields that are standardized with regard to data types, field names, and domain ranges. The Natural Resource Database Template, a database model developed by the national Inventory and Monitoring Program, provides a common starting point for all networks for establishing these tables and fields.
- *Project-specific fields and tables* – The remainder of database objects can be considered project-specific, although there will typically be some overlap among projects. As much as is possible, these project-specific objects will be compatible with those maintained by other networks and cooperators managing similar data sets, especially if integration with other data sets is important for meeting project objectives.

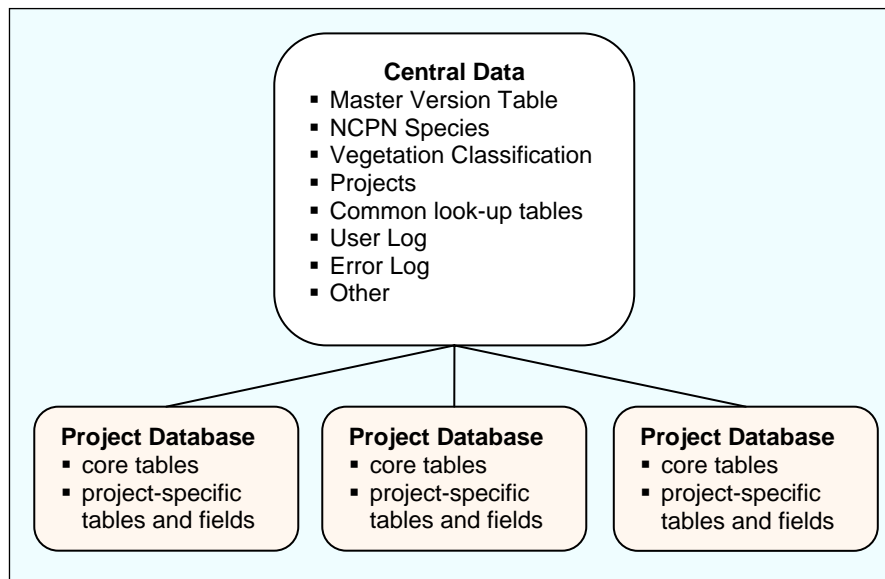


Figure 3-2. Relationship of central data and project databases.

At present, central data files are grouped and maintained in separate MS-Access files (Table 3-1). Project databases access the central data via links established in each project back-end data file.

Table 3-1. Central data files that are common to multiple databases

Data	Description
Master Version Table	For vital signs projects. Tracks version numbers and dates of all protocol narratives and SOPs
NCPN Species	Structurally similar to taxonomic module from NPSpecies; limited to NCPN species
Vegetation Classification	National Vegetation Classification System database; encompasses records associated with park vegetation maps
Projects	Database of past and current projects involving cooperative agreements or contracts
Common Lookup Tables	Standalone tables of parks, watersheds, drainages, place names, sky and wind conditions, land forms, Cowardin Classification, etc. commonly used in project databases
User Log	Secondary users of vital signs data
Edit Log	Identification, evaluation, and action taken for edits made or errors identified in vital signs databases

3.2.2 Levels of Database Standards

Links to central databases and the use of common lookup tables represent the first level of data standards because they are consistent among data sets. The second level of standards is established by the core template fields and tables, which are standardized where possible (however, project-specific objectives could lead to variation among projects). The third level of standards is applied most flexibly to accommodate the range of needs and possibilities for each project, yet always with compatibility and integrity in mind. Figure 3-3 illustrates these levels, with central data providing the foundation upon which levels two and three are built.

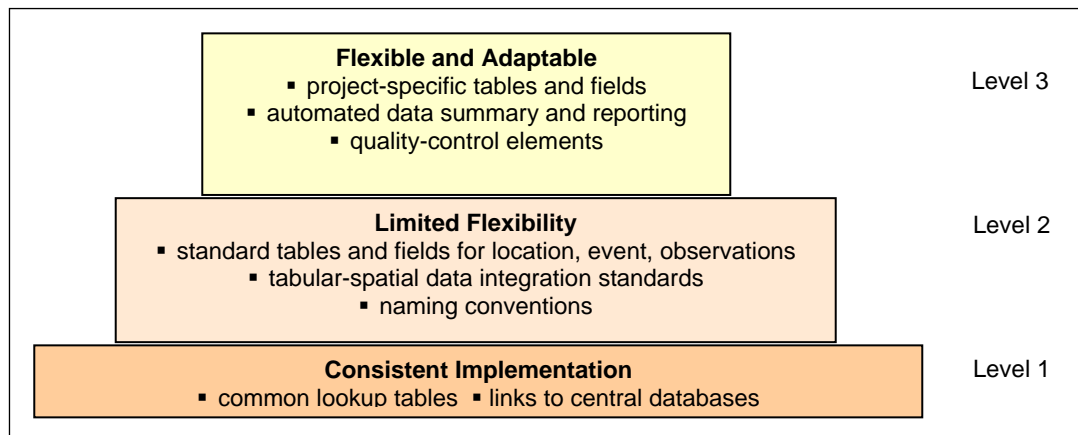


Figure 3-3. Different levels of data standards and their corresponding degree of variability.

3.3 National Information Management Systems

The need for multi-discipline natural resource information management cuts across NPS divisional boundaries, and requires national-level information management strategies for success.

Inventory and monitoring information needs are broadly separated into two categories:

- *Detailed data needed for on-site resource management and protection.* The information used to guide natural resource management decisions must be specific and useful to management staff at parks and central offices.
- *Summary information needed to describe the resources and their condition.* This kind of information usually needs to be aggregated across the National Park Service for use by NPS and DOI managers and central office personnel to answer requests from Congress and for budget, program, and project planning.

The NPS Natural Resource Program Center (NRPC) and the national I&M Program actively develop and implement a national-level, program-wide information management framework. NRPC and I&M staff integrate desktop database applications with internet-based databases to serve both local and national-level data and information requirements. NRPC staff members work with regional and support office staff to develop extensible desktop GIS systems that integrate closely with the database systems. Centralized data archiving and distribution capabilities at the NRPC provide for long term data security and storage. NRPC sponsors training courses on data management, I&M techniques, and remote sensing to assist I&M data managers with developing and effectively using natural resource information.

3.3.1 National-level Application Architecture

To achieve an integrated information management system, three of the national-level data management applications (NatureBib, NPSpecies, and NR-GIS Metadata Database) use a distributed application architecture with both desktop and internet-accessible (master) components (Figure 3-6).

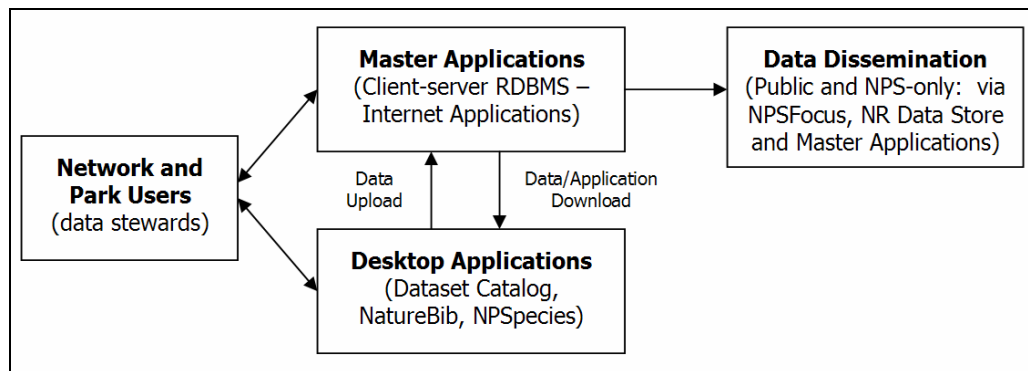


Figure 3-4. Model of the national-level application architecture.

NatureBib

NatureBib is the master database for bibliographic references that merges a number of previously separate databases such as Whitetail Deer Management Bibliography (DeerBib), Geologic Resource Bibliography (GRBib), and others. It also contains citation data from independent databases such as NPSpecies, Dataset Catalog, and the NR-GIS Metadata Database. NatureBib currently focuses on park natural resource-

related references, but it may eventually be linked to references on cultural resources and other park operations. As with NPSpecies and NR-GIS Metadata Database, it is possible to download data from the master web version into the MS-Access desktop version that can be used locally (<http://www.nature.nps.gov/nrbib>).

NPSpecies

NPSpecies is the master biodiversity database for NPS. The database lists the species that are known or suspected to occur in each park unit, and the physical or written evidence for the occurrence of the species (i.e., references, vouchers, and observations). Taxonomy and nomenclature are based on ITIS, the Integrated Taxonomic Information System.

The most current version of NPSpecies for each park or network can be downloaded from the master website into a local, MS-Access version. The Internet-based version is the master database, which can be accessed via password-protected log-ins administered by park, network and regional data stewards assigned for each park and network. The master database requires that species lists are certified by networks before any data will be available to the public. NPSpecies is linked to NatureBib for bibliographic references that provide written evidence of a species' occurrence in a park, and will be linked to NR-GIS Metadata Database to document biological inventory products. The MS-Access application and additional details can be found at the NPSpecies website (<http://science.nature.nps.gov/im/apps/npspp/index.htm>).

Dataset Catalog and NR-GIS Metadata Database

Dataset Catalog is a desktop metadata database application developed by the I&M Program to provide a tool that parks, networks, and cooperators can use to inventory and manage data set holdings. Although not designed as a comprehensive metadata tool, the Dataset Catalog is used for cataloging abbreviated metadata about a variety of natural resource data sets. The Dataset Catalog helps parks and networks begin to meet Executive Order 12906 mandating federal agencies to document all data collected after January 1995. It provides brief metadata and a comprehensive list of all resource data sets used in data management, project planning, and more stringent metadata activities. As with other service-wide applications, the master metadata database (NR-GIS Metadata Database) is available through a website and will be linked to NPSpecies (the NPS species database) and NatureBib (the bibliographic database). It will be possible to download a version in MS-Access format from the master website (Dataset Catalog: <http://science.nature.nps.gov/im/apps/datacat/index.htm> and NR-GIS Metadata Database: <http://science.nature.nps.gov/nrdata>).

3.3.2 Other National-Level I&M Information Management Applications

NPSTORET

STORET (STORage and RETrieval) is an interagency water quality database developed and supported by the Environmental Protection Agency (EPA) to house local, state, and federal water quality data collected in support of managing the nation's water resources under the Clean Water Act. STORET is used by NPS as a repository of physical,

chemical, biological, and other monitoring data collected in and around national park units by park staff, contractors, and cooperators.

NPS operates its own service-wide copy of STORET and makes periodic uploads to the EPA STORET National Data Warehouse so that data collected by and for parks will be accessible to the public. NPS Director's Order 77 indicates that the NPS should archive water quality data in STORET, and the NPS Water Resources Division (WRD) requires that any data collected as part of a funded WRD project be archived in STORET. NPSTORET (also known as Water Quality Database Templates) is the NPS master database designed to facilitate park-level standardized reporting for STORET.

The database is still in development, but metadata, protocols, data dictionaries, and reporting capabilities are available through a front-end form. Upon implementation, network staff and cooperators will be able to use the MS-Access version of NPSTORET either as a direct database for data entry and management, or as a means of submitting data for upload to STORET by WRD staff. The MS-Access application and additional details can be found at: <http://www.nature.nps.gov/water/infodata.htm>. Additional information on STORET can be found at: <http://www.epa.gov/storet>.

Natural Resource Database Template

The Natural Resource Database Template (NRDT) is a relational database in MS-Access for storing and managing inventory and monitoring data, and is a key component in standardizing I&M program database structures. NRDT includes separate modules for different aspects of monitoring project implementation, from sampling design to data analysis and reporting, and includes data management components that describe database table structure, data entry forms and quality checking routines. Established monitoring protocols, including associated databases that are based on NRDT, are available through a web-based protocol clearinghouse (see below). A description of the NRDT application, a data dictionary, and examples are located on the NRDT website (<http://science.nature.nps.gov/im/apps/template/index.htm>).

Natural Resource Monitoring Protocols Clearinghouse

The Natural Resource Monitoring Protocol Clearinghouse (Protocol Database) is a web-based clearinghouse of protocols that have been developed by the prototype monitoring parks or other established protocols used in national park units. The database provides a summary and download of protocols, and in some instances allows the download of associated database components (e.g., tables, queries, data entry forms) that are consistent with the Natural Resource Database Template. See the Protocol Database website for available protocols (<http://science.nature.nps.gov/im/monitor/protocoldb.cfm>).

NR-GIS Metadata and Data Store

The NR-GIS Metadata and Data Store is a key component of the data dissemination strategy employed by the I&M Program. The web-based search tool links dataset metadata to a data server. The interface allows customized public or protected searches of natural resource datasets, inventory products and GIS data produced by the I&M and

Natural Resource GIS Programs. Each park or network is able to post and curate its data on the server. The NR-GIS Data Store will be integrated with the master NR-GIS Metadata Database application to streamline programmatic data documentation and dissemination processes. The simple browse function of this server can be accessed at: <http://nrdata.nps.gov/>. See the NR-GIS Data Store website for further information (<http://science.nature.nps.gov/nrdata>).

Credits

Sections 3.1 and 3.2 were adapted from material prepared by John Boetsch (North Coast and Cascades Network). Section 3.3 was adapted from material prepared by Lisa Nelson (NPS Natural Resource Program Center).

CHAPTER 4. Data Management Process and Work Flow

This chapter gives an overview of how the Northern Colorado Plateau Network (NCPN) natural resource data are generated, processed, finalized, and made available. The process is described in the context of the progressive stages of a project, and the life cycle of the resulting data.

4.1 Project Work Flow

From the perspective of managing work flow, there are two main types of projects:

- *Short-term projects*, which may include individual park research projects, inventories, or pilot work done in preparation for long-term monitoring.
- *Long-term projects*, which are mainly monitoring projects central to the Inventory and Monitoring (I&M) Program, but may also include multi-year research projects and monitoring performed by other agencies and cooperators. Long-term projects typically require a higher level of documentation, peer review, and adherence to standards to ensure consistency over time.

Projects can be divided into five primary stages: planning and approval; design and testing; implementation; product integration; evaluation and closure (Figure 4-1). Each stage is characterized by a set of activities carried out by staff involved in the project. Primary responsibility for these activities rests with different individuals according to the different phases of a project. Additional discussion of the different roles and responsibilities of park and network staff can be found in Chapter 2 of this plan.

4.1.1 Planning and Approval

This initial phase is when many of the preliminary decisions are made regarding project scope and objectives. Funding sources, permits, and compliance are also addressed in this phase. Primary responsibility rests with project leaders and program administrators. Data management responsibilities include reviewing contracts, agreements, or permits for language that describes the formats, specifications, and timelines for project deliverables.

4.1.2 Design and testing

During this phase, details are worked out regarding how data will be acquired, processed, analyzed, reported, and made available to others. The project leader is responsible for developing and testing project methodology, or for modifying existing methods to meet project objectives. It is essential that the project leader and the data manager work together throughout this phase in order to build the basis for good data management throughout the project.

An important part of this collaboration is the development of the data design and data dictionary, where the specifics of data to be collected are defined in detail. Devoting adequate attention to this aspect of project is possibly the single most important part of assuring the quality, integrity and usability of the resulting data. Once the project methods, data design, and data dictionary have been developed and documented, a database can be built to meet project requirements.

4.1.3 Implementation

During the implementation phase, data are acquired, processed, error-checked and documented. Products such as reports, maps, geographic information system (GIS) themes, and other products are developed and delivered during this phase. The project leader oversees all aspects of implementation, from logistics planning, contracting, training, and equipment procurement, to data acquisition, report preparation and final delivery. Throughout this phase, data management staff function primarily as facilitators: they provide training and support for global positioning systems (GPS), database, and GIS applications, ensure data verification and validation, summarize or format data as needed for analyses, and assist with data documentation and product development. The specific roles of data management staff during this phase will vary depending on the project. As much as possible, these roles should be worked out in advance of project implementation.

Towards the end of this phase, project staff members work to develop and finalize the deliverables that were identified in the project planning documents (e.g., protocol, study plan, agreement). Raw and derived data products, metadata, reports and other documentation should be delivered to the project leader, who then works with the data manager to move products to their final repositories.

4.1.4 Product Integration

During this phase, data products and other deliverables are integrated into national and network databases, metadata records are finalized and posted in clearinghouses, and products are distributed or otherwise made available to their intended audience. Depending on the project, another aspect of integration is merging data from a working database to a master database maintained on the network server. This occurs only after the annual working data set has been certified for quality by the project leader. Certain projects may also have additional integration needs, such as when working jointly with other agencies for a common database.

Product integration includes creating records for reports and other project documents in NatureBib, integrating species-related data into NPSpecies, creating or updating ArcCatalog metadata files and Dataset Catalog records, and posting the resulting products to national clearinghouses.

4.1.5 Evaluation and Closure

For long-term monitoring and other cyclic projects, this phase occurs at the end of each field season, and leads to an annual review of the project. For short-term projects, this phase represents the completion of the project. After products are catalogued and made available, the program administrator, project leader, and data manager assess how well the project met its objectives, and to determine what might be done to improve various aspects of the methodology, implementation, and formats of the resulting information. For monitoring protocols, careful documentation of all changes is required. Changes to protocol narratives, standard operating procedures (SOPs), and other procedures are maintained in version tables associated with each document. Major revisions may require additional peer review.

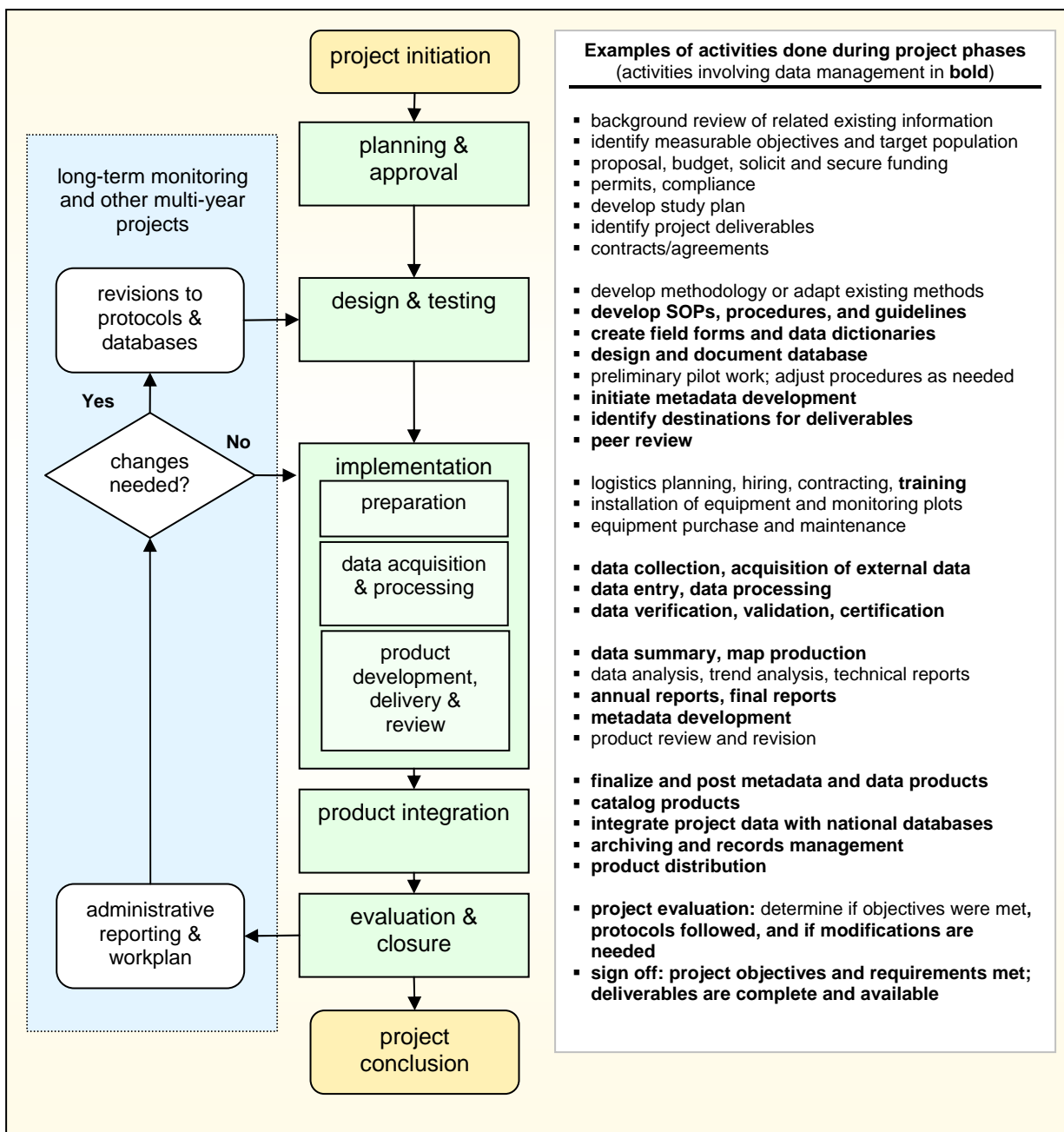


Figure 4-1. Model of project work flow and associated activities for the Northern Colorado Plateau Network.

4.2 Data Life Cycle

During various phases of a project, project data take on different forms and are maintained in different places as they are acquired, processed, documented and archived. This data life cycle is characterized by sequences of events that involve the following components:

- *Raw data* – Data recorded by hand on hard-copy forms, digital files from handheld devices, GPS receivers, telemetry data loggers, etc.

- *Working database* – A project-specific database for entering and processing data for the current season (or other logical period of time). This might be the only database for short-term projects where there is no need to distinguish working data for the current season from the full set of validated project data.
- *Certified data and metadata* – Completed data and documentation for short-term projects, or one season of completed data for long-term monitoring projects. Certification is a confirmation by the project leader that the data have passed quality assurance requirements and are complete and ready for distribution. This confirmation is entered into the Quality Report field of the associated Dataset Catalog record, along with any caveats associated with the data.
- *Master database* – Project-specific database for storing the full project data set, used for viewing, summarizing, and analysis. Only used to store data that have passed all quality assurance steps.
- *Reports and data products* – Information that is derived from certified project data.
- *Edit log* – A means of tracking errors detected and/or changes made to certified data.
- *National databases and repositories* – Applications and repositories maintained at the national level, primarily for the purpose of integration among NPS units and for sharing information with cooperators and the public.
- *Archives and NCPN server* – museum storage of copies of data, metadata and other products generated by projects. Archives are for hard-copy items; electronic versions of data and related materials are stored on server.

Although the data life cycle may vary depending on specific project needs and objectives, the typical life cycle for NCPN proceeds as follows (Figure 4-2):

1. *Acquire data* – For data recorded by hand in the field, data forms should be reviewed regularly (preferably daily) for completeness and validity in order to capture errors as close to their origin as possible.
2. *Archive raw data* – Copies of all raw data files are archived intact. Digital files are copied to an archive subdirectory section for the project; hard copy forms are copied and the originals placed in NPS archives. Archiving of hard copy data forms may occur at the end of a season as a means of retaining all marks and edits made during the verification and validation steps.
3. *Data entry / import* – Data are entered manually from hard-copy forms, and digital data files are uploaded to the working database.
4. *Verification and validation* – The accurate transcription of raw data is verified; data are validated by project leader or subject-matter expert to detect missing data, out-of-range values, and logical errors.
5. *Documentation and certification* – Develop or update project metadata and certify the data set. Certification is a confirmation by the project leader that the data

- have passed all quality assurance requirements and are complete and documented. It also means that data and metadata are ready to be posted and delivered.
6. *Archive versioned data set* – Copies of the certified data and metadata are placed in the project digital archive in both native database format and American Standard Code for Information Interchange (ASCII) format.
 7. *Post data and update national databases* – To make data available to others, certified data and metadata are posted to national repositories such as NR-GIS Data Store. In addition, national databases such as NPSpecies, NPSTORET, and NR-GIS Metadata Database are updated. Note: Data and data products may not be posted if they contain protected information about the nature or location of sensitive, threatened or endangered species, or other natural resources of management concern (see Chapter 9).
 8. *Upload data* – Certified data are uploaded from the working database to the master project database. This step can be omitted for short-term projects where there is no need to distinguish working data for the current season from the full set of certified project data.
 9. *Reporting and analysis* – Certified data are used for analysis and reporting, including annual summary reports for monitoring projects. Depending on project needs, data might be exported for analysis or summarized within the database.
 10. *Store products* – Reports and other data products are stored, according to format and likely demand, in the NCPN server archive and/or in NPS archives.
 11. *Post products and update national databases* – To make data available to others, reports and other products are posted to national repositories such as NR-GIS Data Store or the NR Data Image Server. In addition, products are cataloged in NatureBib. Data products may not be posted if they contain protected information about the nature or location of sensitive, threatened or endangered species, or other natural resources of management concern (see Chapter 9).
 12. *Distribute data and information* – Data, metadata, reports and products can be shared and distributed in a variety of ways – especially via the web-based national databases and repositories, by FTP or mailing in response to specific requests, or by providing direct access to project records to cooperators. In all cases, distribution will follow legal requirements under the Freedom of Information Act, with limitations established to protect information about sensitive resources (see Chapter 9).
 13. *Track changes* – All subsequent changes to certified data are documented in an edit log, which accompanies project data and metadata upon distribution. Significant edits will trigger reposting of the data and products to national databases and repositories.

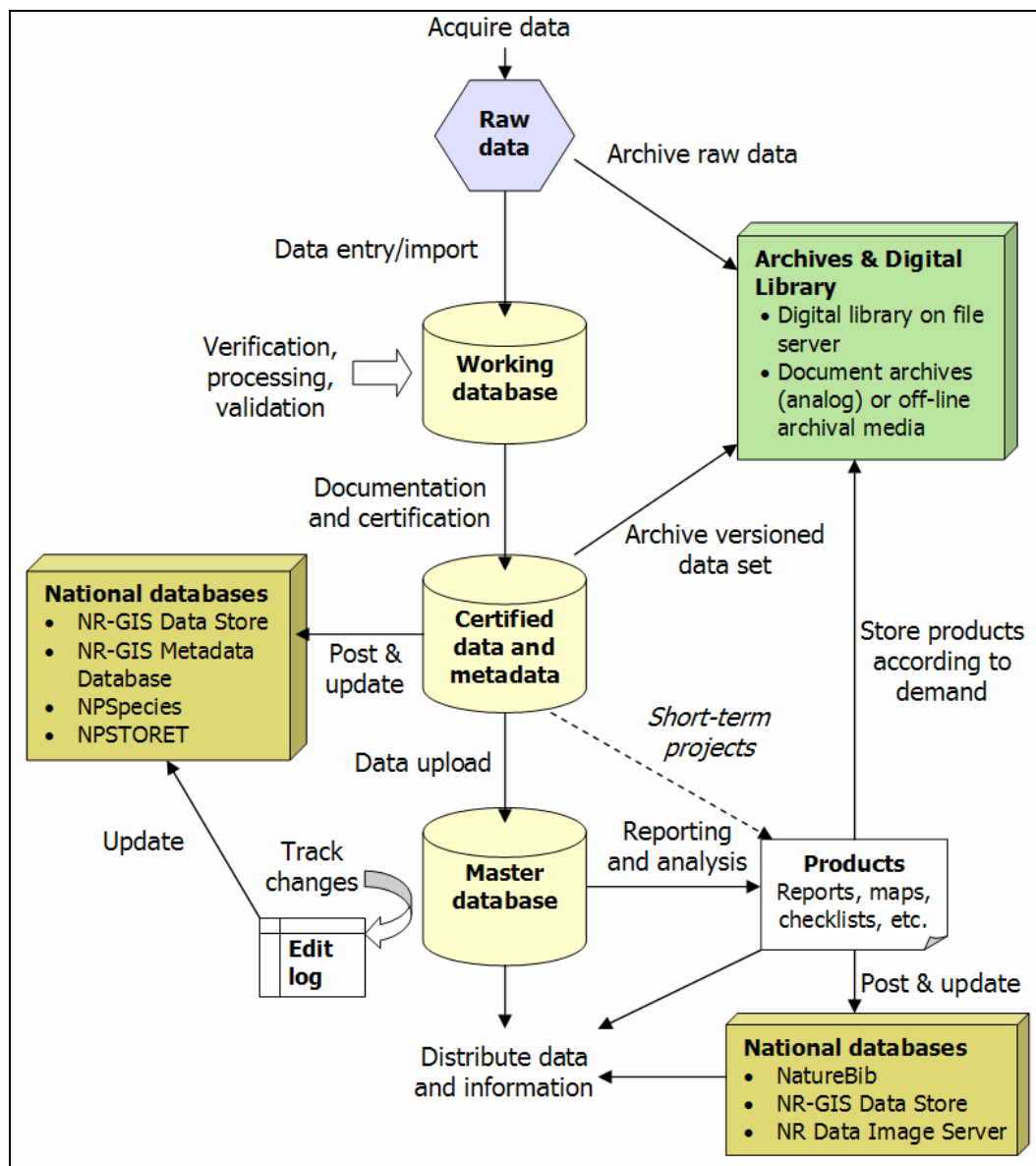


Figure 4-2. Sequence of events comprising a project life cycle.

This sequence of events occurs in an iterative fashion for long-term monitoring projects, whereas this sequence is followed only once for short-term projects. For projects spanning multiple years, decision points include whether or not a separate working database is needed, and the extent to which product development and delivery is repeated year after year.

4.3 Integrating and Sharing Data Products

Once project data and data products have been finalized, they need to be secured in long-term storage and made available to others. To accomplish this requires a range of information systems that includes product repositories, clearinghouses, and web applications. Each of these systems has a different purpose and function, as shown in Figure 4-3.

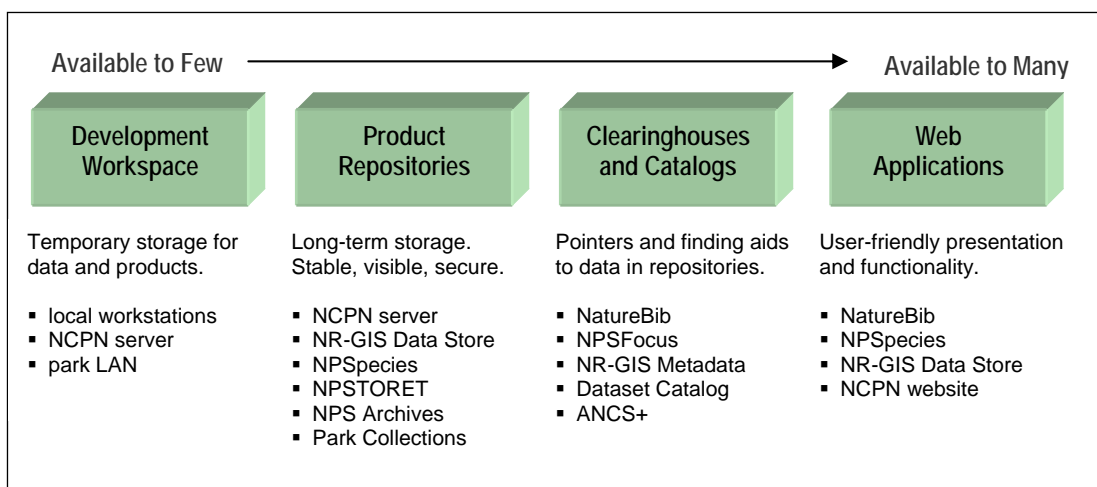


Figure 4-3. Systems for storing and disseminating project information.

4.3.1 Data distribution

The process of product distribution involves several steps (Figure 4-4). As products are finalized by the project leader, they are sent to the appropriate person for integration, posting and distribution. In most cases it will be either the data manager or GIS specialist who reviews the product for conformance with format standards, then stores the product in the appropriate repository.

After storing the products, they are indexed via the metadata records that are part of the NR-GIS Metadata Database. The metadata records provide pointers to data and data products. Distribution then follows as data discovery allows potential users to find and either request or download the data sets from their repositories.

4.3.2 Integration with National Databases

In addition to storing and distributing data products, product integration also involves updates to national databases such as NPSpecies and NPSTORET. Both of these databases have local desktop databases which can be updated with data collected during the course of a project. Desktop databases are then uploaded and synchronized with the national databases on a regular basis.

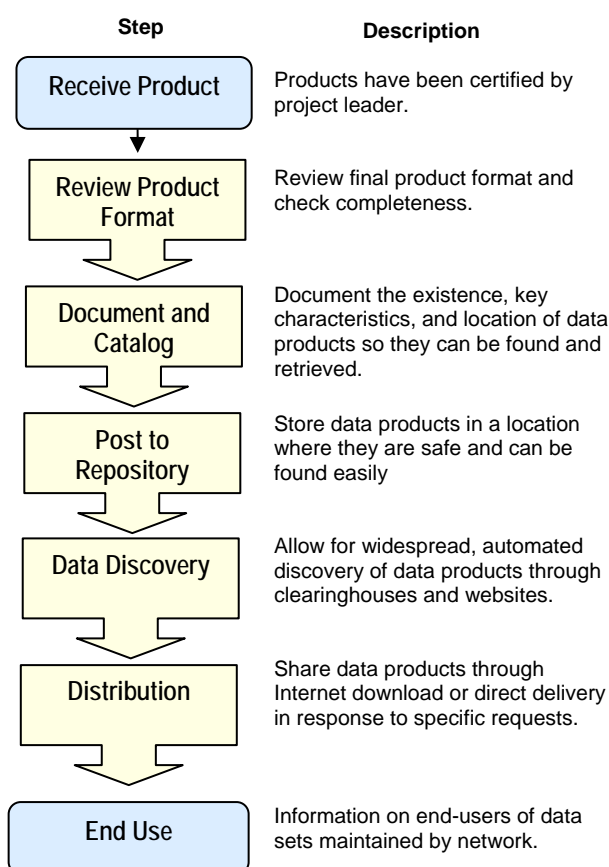


Figure 4-4. Steps included in product distribution.

To update NPSpecies, data on the status and occurrence of species in NCPN parks will be compiled and added to the database upon delivery of data and data products. Synchronization with the master version of NPSpecies will occur at least twice annually, or more frequently depending on the timing and amount of updates.

The water quality component of the Natural Resource Challenge requires that networks archive all water quality data collected as part of the monitoring program in a STORET (STORage and RETrieval) database maintained by the NPS Water Resources Division (WRD). NCPN has developed an MS-Access database (NCPN H₂O) that consolidates available water quality data collected in and near the 16 NCPN park units. Associated with this database are water quality standards assessment tools that allow comparisons of historical and current data with applicable state standards. NCPN will maintain this database and integrate new data collected so it can serve as an ongoing tool for the network's long-term water quality monitoring and analysis needs.

On an annual basis NCPN will compile and format new water quality data from NCPN H₂O into an electronic data deliverable (EDD) that is compatible with WRD-STORET. WRD will ensure that content is transferred to the Environmental Protection Agency's STORET database (Figure 4-5).

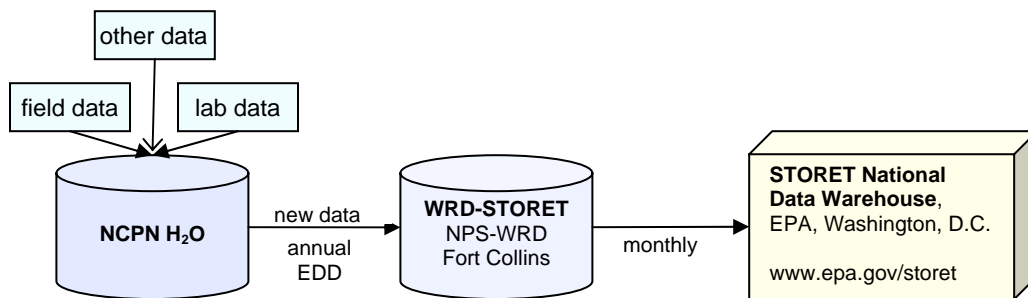


Figure 4-5. Data flow diagram for water quality data.

Credits

This chapter was adapted from materials developed by John Boetch (North Coast and Cascades Network), in collaboration with Dorothy Mortenson (Southwest Alaska Network), Vel Decker (Cape Cod National Seashore), Sara Stevens (Northeast Coastal and Barrier Network), and Doug Wilder (Central Alaska Network).

CHAPTER 5. Data Acquisition and Processing

This chapter describes the general procedures the Northern Colorado Plateau Network (NCPN) follows for acquiring and processing natural resource-related data. Procedures will vary depending on the data source, which can be placed into three general categories:

- **Northern Colorado Plateau Network data:** data resulting from projects that are initiated, sponsored, or funded by the Northern Colorado Plateau Network.
- **Other National Park Service (NPS) data:** data resulting from projects that are initiated, sponsored, or funded by park units, or by regional or national NPS programs.
- **External data:** data produced or managed by agencies, organizations, or individuals other than the National Park Service.

These categories are addressed in sections 5.1 through 5.3, below. Geospatial data, which can originate from any of these categories, are treated in section 5.4.

5.1 Northern Colorado Plateau Network Data

5.1.1 Inventory Projects

Data acquisition and processing of network inventory data is a straightforward process due to the high level of network control over the projects. Most NCPN-sponsored projects are completed by cooperators working under a contract or agreement that has been written specifically by the network for the project. In these agreements NCPN itemizes data deliverables and formats that are required from the cooperator. The data manager works closely with the principal investigator and the project leader to develop these data criteria, and to develop an MS-Access database modeled on the Natural Resource Database Template that is tailored to the specific data needs of the project. Additional data specifications usually included in agreements are procedures for acquiring and documenting project photographs, collecting specimens, using global positioning systems (GPS), and delivering geospatial data.

Data processing typically consists of reviewing the project deliverables, integrating the project into the various NCPN cataloging systems, and distributing project results. Principal investigators are responsible for verifying and validating the data they submit; however, NCPN performs additional quality checks on all data sets. Data management staff are usually in contact with the principal investigator after the submission of final products in order to resolve discrepancies or answer questions that inevitably arise as staff work with the data.

The process of distributing and integrating inventory project data is lengthy and complex, comprising many steps and using multiple data systems. Figure 5-1 shows a worksheet developed by the network to help data management staff move projects through this process. Not all distribution, data maintenance, and data archiving steps are shown on

this worksheet. Additional details on these steps are presented in Chapter 9 (Data Dissemination) and Chapter 10 (Data Maintenance, Storage, and Archiving).

Northern Colorado Plateau Network Inventory Project Data: Processing Checklist		
Project Name _____		
Project Leader _____		
Project Cooperator/PI _____		

REVIEW DRAFT	Received (date and initials)	Reviewed (date and initials)
review draft, final report		
review draft, tabular data		
review draft, GIS data		

FINAL PRODUCT	Received	Reviewed
final report		
final tabular data		
final GIS data		
other		

PHOTOS	Received	Reviewed	Scanned	Photo db	Archive Location or Path
photos					

SPECIMENS	Received	Reviewed	ANCS- .csv file	Comments
specimens				

INTEGRATION	Record ID or file name	Notes
NatureBib		
Dataset Catalog		
ArcCatalog		
NPSpecies		

INTEGRATION	Record ID or file name	Notes
Narratives		
Referenced on website		
NCPN website		
Biodiversity Data Store		
NR-GIS Metadata		

DISTRIBUTION	ant	blm	bma	cay	cutr	color	coim	cutt	dmo	fiba	gasp	have	nabr	pug	uca	unn
Final report																
Tabular data																
GIS data																
ANCS- .csv file																
Comments																

ARCHIVE	Location / Path
data	
reports	
archive readme	
contract / agreement	
research permit	
field forms	
other	

Comments:

Figure 5-1. Processing checklist for NCPN inventory data

5.1.2 Monitoring Projects

Data acquisition for network monitoring projects is guided by established protocols that include step-by-step procedures for all aspects of data collection, data entry, quality assessment (QA), quality control (QC), reporting, analysis, distribution, and archiving. Depending on the protocol, data can be acquired by park staff, network staff, cooperators, or other agencies or organizations.

Monitoring data need to go through processing and integration steps that are similar to inventory data; however, many of the steps are repeated annually or on a schedule corresponding to sampling frequency. Each monitoring project will have a processing and integration checklist that is specific to the project to ensure that all steps are completed.

5.2 National Park Service Data

5.2.1 Data Mining

A fundamental step in developing and maintaining the information base for NCPN is locating, evaluating, and documenting, on an ongoing basis, park-related natural resource information. The term “data mining” refers to this process, which requires regular visits

to network parks and establishing data mining procedures specific to each park. The range of materials that require documenting is broad, ranging from historical inventories, to complex databases, to remote-sensing data.

The network has put extensive effort into data mining during its first five years of operation, in order to locate and catalog a significant backlog of materials. Most of this backlog will be eliminated by 2006, at which time data mining will become a maintenance process, with emphasis on documenting new materials.

Cataloging Data

As a general rule, the goal of network data mining is not to acquire and store, at the network, copies of all data residing at parks. Instead, cataloging tools are used to describe and document data sources so that potential users can find them. Data that are an exception to this rule are documents or data sets that are of specific need or interest to network staff (e.g., geographic information system (GIS) data, monitoring data), or that complement network projects. Also, as NatureBib expands its capability to store and serve full-text versions of documents, NCPN is working with parks to identify and obtain electronic copies of documents for full-text posting on the Internet where they can become widely accessible.

Parks within the network vary widely in how natural resource information is organized and stored. While some parks have developed efficient and standardized methods of cataloging new information as it arrives, other parks have no formalized approach for organizing their natural resource materials.

NCPN works on-site with park staff to locate and catalog their natural resource information. Table 5-1 summarizes the range of park-based data that the network is cataloging, and the associated processing steps. Specific details on processing steps are provided in Appendix B (NCPN user guidelines for NatureBib), Appendix C (NCPN user guidelines for Dataset Catalog), and Appendix D (NCPN user guidelines for NPSpecies).

Table 5-1. Examples of park-based natural resource information that is processed or documented by the network.

Data Description	Processing
Gray literature, unpublished reports, research summaries	Review and document in NatureBib. Evaluate for species data and link to NPSpecies. Obtain copies for network files (preferably electronic) as appropriate; upload full-text document to NatureBib (if not subject to copyright restrictions)
Published reports, journal articles	Review and document in NatureBib. Evaluate for species data and link to NPSpecies. Obtain copies for network files (preferably electronic) as appropriate; upload full-text document to NatureBib (if not subject to copyright restrictions)

Data Description	Processing
Investigator Annual Reports	If IAR is the only reference to a project, document in NatureBib. If a more comprehensive report has resulted from the project, create a NatureBib record for the report and reference the IAR in the NatureBib record
Photographs	If photos are part of an assemblage accompanied by documentation, enter into Dataset Catalog. Evaluate for NPSpecies data (photo vouchers)
Databases, spreadsheets, other electronic data assemblages — undocumented	Review for associated documentation. Location project leader, if possible, for further explanations. Create Dataset Catalog record and document to the extent possible
Databases, spreadsheets, other electronic data assemblages — documented	Create dataset catalog record. Evaluate for NPSpecies data. Obtain copies for network files as appropriate
GIS data — undocumented	Retain copy at NCPN office as applicable. Document in NCPN GIS Inventory database. Create metadata using ArcCatalog
GIS data — documented	Retain copy at NCPN office as applicable. Document in NCPN GIS Inventory database; maintain metadata in ArcCatalog
Species lists	Create NatureBib record if author and date are included with list. Evaluate for NPSpecies data
Assemblages of field forms	Create Dataset Catalog record; evaluate for NPSpecies data
Data collected by NPS regional or national programs (e.g., air quality, sound, night sky)	Create Dataset Catalog record
Data collected and managed by other agencies (e.g., stream gauging stations, climate, breeding bird data, other monitoring programs)	Create Dataset Catalog record; evaluate for NPSpecies data
ANCS+ natural history specimen data	Evaluate for inclusion in voucher table of NPSpecies.
Park library records (ProCite)	Evaluate for inclusion in NatureBib
Park archives	Evaluate for inclusion in NatureBib, Dataset Catalog, NPSpecies

NCPN data management staff complete most of these cataloging tasks, and have been the primary users of NatureBib, NPSpecies, and Dataset Catalog. Most parks have had no extra staff available to perform this work or to devote to using the databases. NCPN places a high priority on maintaining and building these databases, and will continue to perform the work as needed. Data management staff will provide training to park staff interested in learning to use the databases, and will provide reports from the databases in formats that are useful and easily accessible to park staff (e.g., hard-copy printouts, web-based species lists). A summary of the status of data that have been compiled for network parks is presented in Appendix I (Summary of NCPN data resources).

Data Conversion

Most data sets developed at parks are not maintained in fully-normalized database formats, nor do they need to be. However, the network and parks have identified some data sets that are priorities for conversion to current database standards. These include data on threatened, endangered, or sensitive (TES) species, long-term vegetation monitoring, long-term riparian bird monitoring, data on invasive species, and others. These conversion projects can be time-consuming and are selected carefully. To avert database problems for new projects, network data management staff are available to help parks as possible or needed with database design, using the Natural Resource Database Template as a model.

5.3 External Data

Organizations and agencies outside the National Park Service have been an ongoing source of natural resource data for the network and are included in the network's data mining activities. Processing external data follows the same steps and procedures as processing park data: information is evaluated, entered into one or more cataloging databases, and is then posted or made available as appropriate.

Museums and Herbaria

One of the more challenging data mining tasks has been acquiring information on specimens that were collected within park units, but that are housed in a variety of repositories across the country. The Inventory and Monitoring Program at the Washington Office has obtained specimen data from major museums and herbaria that have their holdings in electronic format. NCPN is examining these records for inclusion into NPSpecies. Smaller regional and state repositories will be checked as time and budget allows.

Frequently the associated and required Automated National Cataloging System (ANCS+) records for these specimens do not exist at the parks. NCPN works with park museum curators when receiving and managing specimen data from external sources, and provides them with formatted data for uploading into ANCS+, if appropriate.

National Programs

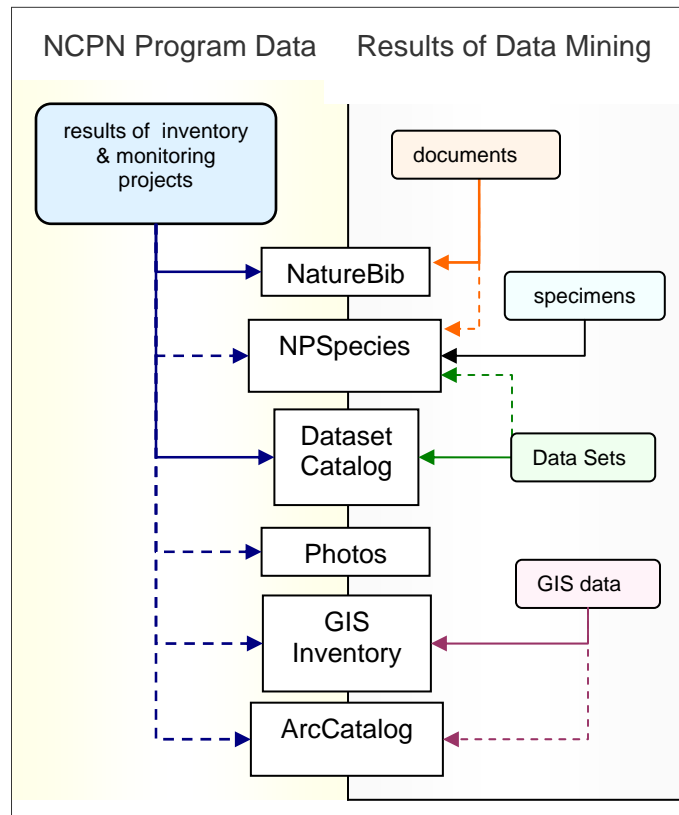


Figure 5-2. Integration of network data into data catalogs. Dotted lines indicate a catalog may be used depending on data content.

Agencies such as U.S. Geological Survey and the U. S. Fish and Wildlife Service regularly conduct research in national parks. Resulting data may be specific to a park unit, or may encompass a much broader geographic area. The volume of this information can be daunting, particularly for subjects that have been extensively studied (e.g., bighorn sheep, Colorado River native fisheries, Peregrine Falcons). NCPN focuses primarily on creating NatureBib records for reports, publications, or other documents resulting from agency projects. While extensive data sets may result from the research, Dataset Catalog records are not created unless a park is actively contributing to the data set, or the park has direct access to the data. For example, breeding bird surveys, climate, air quality, and water quality programs in parks have associated Dataset Catalog records, as parks are contributing regularly to the data sets and have access to the data.

Non-Governmental and Other Organizations

NCPN also acquires data from private and non-profit organizations. NatureServe and its associated network of natural heritage programs have been a source of information on sensitive, threatened and endangered species locations, which is cataloged in NatureBib, NPSpecies, or both. Valuable publications and data have also been obtained from local and state Audubon chapters, Rocky Mountain Bird Observatory, and other private sources. References to theses and dissertations related to park research are located through on-line database searches, as are journal articles and other publications that reference park-based research.

5.4 GIS Data

Numerous geospatial data sets correspond to park units and surrounding areas in the Northern Colorado Plateau Network. These data sets are acquired by park staff, through cooperative national or regional NPS projects, and from multiple external organizations and agencies.

Network parks vary widely in the use of GIS, and in the volume and quality of geospatial data that are available. In order to track park and network GIS resources, NCPN staff established an MS-Access database to serve as a general spatial dataset inventory. The GIS Inventory Database is primarily a finding aid that allows staff to quickly view which data are available, at what scale, where the files are located, and whether metadata documentation exists (Figure 5-3). Only a subset of the spatial datasets entered in this database actually reside on the NCPN server. Most are retained and managed at the park level. A summary of data currently entered in the GIS Inventory Database is presented in Appendix I (Summary of NCPN data resources).

Almost all current data sets distributed by federal or state agencies have accompanying Federal Geographic Data Committee (FGDC) -compliant metadata. Older or more obscure external GIS data may have incomplete or nonexistent metadata. The GIS Inventory database does not replace the more comprehensive FGDC-compliant metadata databases; however, it can serve as a precursor to metadata documentation if none exists. Information compiled in this database includes: file name, description, file location, geographic extent, projection, scale, data sensitivity, metadata status, and estimated

completion date. GIS files are also categorized based on whether they constitute one of the I&M Program’s 12 Basic Natural Resource Inventory Data Sets.

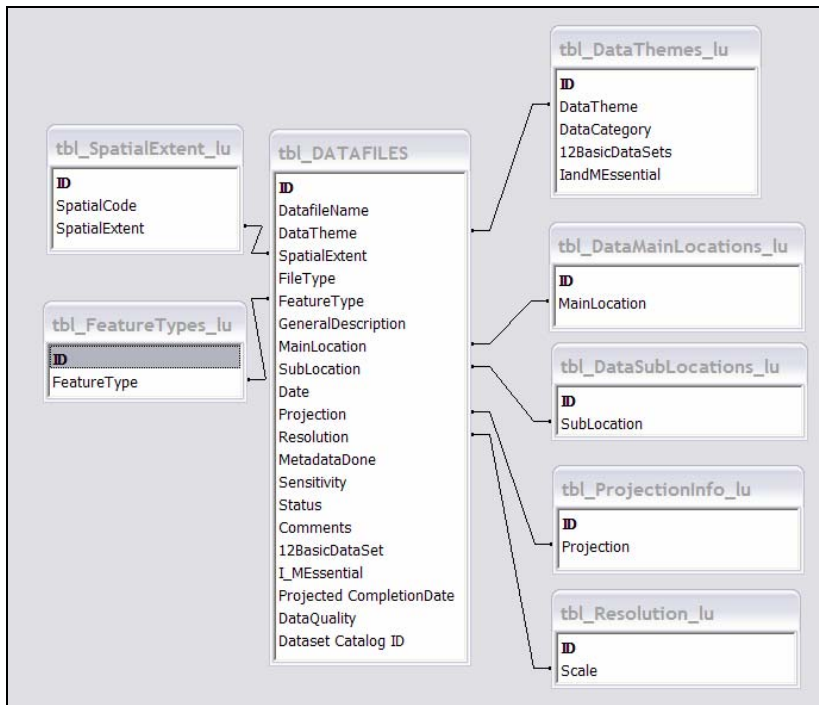


Figure 5-2. Structure of the NCPN GIS Inventory database.

NCPN has specifically targeted obtaining GIS data it considers essential for displaying, interpreting, or analyzing inventory and monitoring data. These “I&M Essential” categories (Table 5-2), which are also tracked in the GIS Inventory Database, are priorities for acquisition or completion, either through assistance from the IMR GIS program, Special Emphasis Project Allocation System (SEPAS) funding, direct network assistance, or other means.

Table 5-2. GIS data sets identified by NCPN as essential to inventory and monitoring work.

<p>Base Cartographic Layers Adjacent Land Ownership Special Designations (RNAs, Wilderness) Private In-holdings</p> <p>Natural Resources Hydrology - Seeps/Springs Hydrology - Misc. (tinajas, ponds, etc.) Fire Occurrence and History Plants - TES Plants - Exotic/Invasive Animals - TES Animals - Exotic/Invasive</p> <p>Management Grazing Allotments</p>	<p>Park Infrastructure Roads - Paved Roads - Unpaved Roads - 4WD Trails - Established Campgrounds (and backcountry sites) Parking Lots Pullouts Permanent Structures Fences Utilities (pipelines, powerlines, etc.)</p> <p>Resource or Stressor Monitoring Biological Resource Monitoring Locations Physical Resource Monitoring Locations</p>
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5.4.1 Acquisition of new spatial data

Spatial data acquired by the network either directly or through contractors must meet established standards and product specifications. GIS data standards established by NPS are presented in Appendix G (National Park Service GIS data specifications). Additional standards or requirements may be identified on a project-by-project basis.

Spatial data gathered using global positioning system (GPS) units must also meet established standards. Appendix H (NCPN specifications for using global positioning systems) addresses GPS instruments, instrument settings, field operation, data collection, data processing, and a standardized method for acquiring and managing location data.

CHAPTER 6. Quality Assurance and Quality Control

The success of Inventory and Monitoring (I&M) Program networks is dependent on the quality of the data they collect and manage. Analyses performed to detect ecological trends or patterns require data with minimal error and bias. Inconsistent or poor-quality data can limit the detectability of subtle changes in ecosystem patterns and processes, can lead to incorrect interpretations and conclusions, and could greatly compromise the credibility of the I&M Program. To ensure that NCPN produces and maintains data of the highest possible quality, procedures have been established to identify and minimize errors at each stage of the data lifecycle (Figure 6-1).

6.1 National Park Service Mandate for Quality

The National Park Service Director's Order #11B, "Ensuring Quality of Information Disseminated by the National Park Service," was issued in order to promote data quality (National Park Service 2002). It defines '*quality*' as incorporating three key components: objectivity, utility, and integrity.

Objectivity consists of: 1) *presentation*, which focuses on whether disseminated information is being presented in an accurate, clear, complete, and unbiased manner within a proper context; and 2) *substance*, which focuses on ensuring accurate, usable, and reliable information.

Utility refers to the usefulness of the information to its intended users.

Integrity refers to the security of information; e.g., protection from unauthorized access or revision to ensure that the information is not compromised through corruption or falsification.

Order #11B also specifies that information must be based on reliable data sources that are accurate, timely, and representative of the most current information available. These standards apply not only to National Park Service (NPS) -generated information, but also to information provided by other parties to the NPS if the NPS disseminates or relies upon this information.

6.2 Quality Assurance and Quality Control Mechanisms

Palmer (2003) defines *quality assurance* (QA) as "an integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the consumer." He defines *quality control* (QC) as "a system of technical activities to measure the attributes and performance of a process, item, or service relative to defined standards." Quality assurance procedures maintain quality throughout all stages of data development. Quality control procedures monitor or evaluate the resulting data products.

QA/QC mechanisms are designed to prevent data contamination, which occurs when a process or event introduces two fundamental types of errors into a data set:

- *Errors of commission* include those caused by data entry or transcription errors, or malfunctioning equipment. They are common, fairly easy to identify, and can be effectively reduced up front with appropriate QA mechanisms built into the data acquisition process, as well as QC procedures applied after the data have been acquired.
- *Errors of omission* often include insufficient documentation of legitimate data values, which could affect the interpretation of those values. These errors may be harder to detect and correct, but many of these errors should be revealed by rigorous QC procedures.

6.3 Roles and Responsibilities

Quality assurance methods should be in place at the inception of any project and continue through all project stages to final archiving of the data set. It is essential that each member of the data management group have a stake in data quality, and is responsible for the quality of the results generated from his or her tasks. In particular:

The data manager is responsible for:

- developing protocols and standard operating procedures (SOPs), in collaboration with the project leader, to ensure data quality
- making project leaders, technicians, etc., aware of the established procedures and enforcing adherence to them
- evaluating the quality of all data and information against NPS standards before dissemination outside the network
- performing periodic data audits and quality control checks to monitor and improve the data quality program.

Project leaders must:

- be aware of quality protocols and convey their importance to technicians and field crews
- ensure compliance with the protocols
- validate data after the verification process is complete
- review all final reports and information products.

Project technicians must:

- follow established protocols for data collection, data entry, and verification
- inform the project leader or data manager of quality-related problems or difficulties.

6.4 Goals and Objectives

While a data set containing no errors would be ideal, the cost and effort of attaining 100% accuracy would likely outweigh the benefits. Instead, two factors can be considered when setting data quality goals:

- the percent of entries that are incorrect (frequency of errors)
- the magnitude of the error (criticality of errors)

The significance of an error can vary depending on the data set and where the error occurs. A two-digit number with a misplaced decimal point is a significant error (e.g., 99 vs. 9.9). A four-digit number with an incorrect decimal value (e.g., 9999.99 vs. 9999.98, could retain an acceptable level of accuracy.

The most effective mechanism for ensuring that a project produces high-quality data is to determine procedures that direct project staff through accurate data collection, entry, and validation, and adhere to them. All monitoring projects undertaken by NCPN will include a comprehensive set of SOPs that incorporate quality control in each stage of data collection and processing.

Although specific QA/QC procedures will depend upon the individual vital signs being monitored and must be specified in the protocols and SOPs for each monitoring vital sign, some general concepts apply to all network projects. The general QA/QC procedures presented in this plan were primarily adapted from the Draft Data Management Protocol (Tessler & Gregson 1997) and the ideas contained in Michener and Brunt (2000). These general guidelines will ensure that all data collected are checked for integrity before being integrated into the monitoring program databases.

6.5 Data Collection

Careful, accurate recording of field observations in the data collection phase of a project is the cornerstone for building a high-quality data set. Unlike a typographical error that occurs when a recorded observation is incorrectly transferred from a paper field form to a digital database, an incorrect entry in the field is not easily corrected. Attention to detail during data collection is crucial to overall data quality.

Before the data collection phase of a project begins, the data manager and project leader determine data collection and storage protocols. Field sheets and field data recording procedures must be reviewed by the data manager and documented in the protocol SOPs. The project leader, in turn, ensures that field crews understand the procedures and closely follow them in the field. If training is needed, the data manager will work with the project leader to provide it. Field technicians are responsible for proofing raw data forms in the field, ensuring their legibility, and verifying and explaining any unusual entries. They are expected to understand the data collection forms, know how to take measurements, and follow the protocols.

6.5.1 Methods for Reducing Data Collection Errors

Ensure that field crews receive proper training.

Protocols and SOPs alone cannot guarantee that high quality data will be collected. Adequate training is essential for field crews to understand and perform data collection procedures. A training manual may be helpful for long-term monitoring data collection efforts, and for those projects that will involve a large number of field staff, especially if staff turnover is anticipated.

Use a formatted, project-specific data sheet as opposed to a field notebook.

Standardized data sheets that clearly identify the data to be recorded, and that reflect the design of the computer data entry interface, will help ensure that all data are recorded and

entry errors are minimized. Acid-free paper is required to prevent degradation and subsequent data loss.

Data sheets should contain as much preprinted project information as possible, and include essential metadata such as the name of the data collector and date. Data sheets should clearly specify all required information, using examples where needed to ensure that proper format are used.

All data added to the data sheet must be printed and clearly legible. If alterations to the data are necessary, the original data should be crossed out with a single line and the new data written next to the original entry. Data should never be erased and data should not be overwritten.

After data entry and data verification and validation, copies of all original data sheets should be made and checked for legibility and completeness (i.e., no data cut off at the edges). The copies of the data sheets will be stored as specified in the protocol SOP, and the original data sheets will be archived.

Use an electronic device for data collection whenever possible.

The use of handheld devices such as GPS units minimizes the need for manual data entry from field forms and associated transcription and data entry errors. Specially designed data dictionaries can be developed to fit project requirements and can incorporate on-the-spot QA/QC checks. Electronic devices are not a substitute for data hand-written on field sheets; rather, they are a tool to make subsequent database entry more efficient.

When electronic devices are used for data collection, data files should be downloaded daily to avoid potential loss of information. Thus, if a unit fails during data collection, only the current day's data are lost. Batteries should be checked prior to a data collection trip, and they should be charged at the end of every field day.

Use automated data loggers where appropriate.

Instruments with their own data acquisition systems are useful for collecting some types of data, such as water and air quality data. These devices can be calibrated and programmed to automatically record data and store them for later download directly to a computer, thereby eliminating the possibility for manual data entry errors. Data loggers are an efficient method for recording continuous sensor data, but routine inspections are necessary, and environmental constraints, as well as power (e.g., sufficient battery charge) and maintenance requirements, are potential pitfalls when using these instruments. Regular downloads are required as physical memory is usually limited.

Consider calibration, maintenance, and minimum timing requirements of field equipment.

Accurate field measurements are possible only if field equipment is regularly calibrated and maintained. Once in the field, allow sufficient time for field equipment to adjust to its environment so it will record accurate measurements (for example, when using water quality probes and GPS units). Researchers should maintain records of equipment calibration and equipment failures as an integral part of their field data.

Be organized and keep a log.

Organization is the key to good data collection methods. Maintaining a log of important decisions and events will help clarify information and contribute to an accurate report.

Perform quantitative assessments of data quality.

Repeating measurements is the primary tool for performing quantitative assessments of data. Project leaders should periodically review the work of field technicians to ensure that their work does not drift from standards during the course of the field season.

6.6 Data Entry

Data entry is the process where raw data are transferred from paper field forms into an electronic data format. When data are gathered or stored digitally in the field (e.g., on a data logger), data entry consists of the transfer of data (downloading) to a file that can be moved into database tables.

Data entry should occur as soon as possible after data collection is completed, or as an on-going process during long projects, and by a person who is familiar with the data. The primary goal of data entry is *to transcribe the data from paper records into the computer with 100% accuracy*, although errors are unavoidable during data entry. Thus, all data are checked and corrected during the data verification process (see below).

The data manager, along with the project leader, provides training in the use of the database to all data entry technicians and other users. The project leader makes certain that data entry technicians understand how to enter data and follow the protocols. Data entry technicians are responsible for becoming familiar with the field data forms, the database software, database structure, and any standard codes for data entry used by NCPN.

6.6.1 Methods for Reducing Data Entry Errors

Enter or download data in a timely manner.

All data should be entered or downloaded into the project database as soon as possible after collection. Data entry should not be delayed until all the project data have been collected.

Design efficient data entry forms.

A full-screen data entry form that mimics the field data forms can reduce manual data entry errors due to the 1:1 correspondence of the attributes.

Design data entry methods that distinguish between newly-entered and previously-validated data.

New records will be entered into an empty database. These records will be appended to the master data set only after formal verification and validation has been completed. When this procedure is not practical, a field in the database identifying the status of validation and verification for each record will be completed. (The process for validation and verification will be detailed in the data management SOPs associated with the project.)

Track record creation and edit details in the database.

Fields that store the date a record is created or modified, and the initials of the person creating or modifying it, increases the level of personal responsibility for the accuracy of data entry. This feature also allows the data manager or project leader to determine if error patterns can be traced to a particular person, and follow up with additional staff training to correct the problem.

Build automated error checking features into the database.

QA/QC measures for data entry will be built into the database design to perform automatic validation checks of data. Database entry forms can reduce transcription errors through auto-filled fields, range limits, pick lists, and spelling checks. These forms can also provide controlled access to the database (i.e., forms are set for data entry only, which prevents accidental deletion or alteration of existing data) and can control the sequence of data entry (i.e., certain fields require an entry before more information can be entered). Error messages can alert the operator when mistakes are made and require correction

- *Auto-filled fields.* Whenever possible, the data in a field should be auto-filled by the computer. For example, if a location ID is composed of a park code, project code, and a unique number, those elements are automatically inserted into the location ID field, ensuring that the record always contains a unique identifier.
- *Range limits.* Where the appropriate values for a particular field span a finite range, the data entry program can check the entered value against the specified minimum and maximum values for that parameter. When a value is outside the accepted range, a warning message appears and asks the user to reenter a valid value. For some fields, values outside a specified 'normal' range may be acceptable. In this case, the warning message asks the user to verify the entry before continuing.
- *Pick lists.* The data entry application may also use pop-up pick lists for standardized text items where spelling errors can occur. For example, rather than typing in a species code or name, the code or name is selected from a list of valid values and automatically entered into the species field. A pick list may also be used when only certain entries are acceptable.
- *Unique constraints.* Duplicate and incorrect data entry can often be caught with the application of unique constraints on data entry fields. These constraints are particularly useful when importing data from other applications.

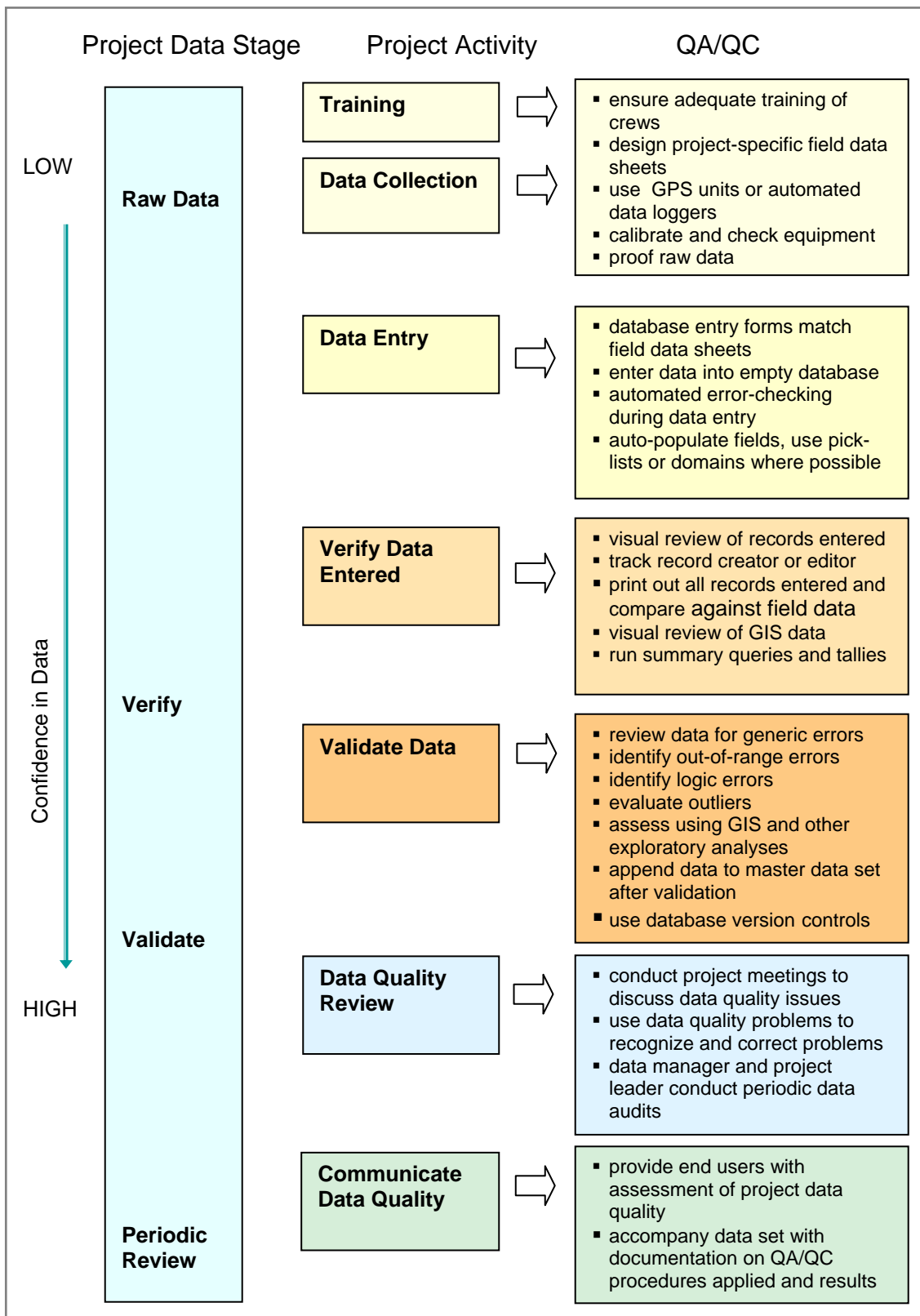


Figure 6-1. Schematic of QA/QC controls during project stages

Provide a clean, organized work environment.

Desktop space near the computer should be free of clutter and distractions. There should be enough space for two stacks of paper documents, one from which data are being entered and one from which data have been entered. A pad or notebook should also be available for making notes.

6.7 Verification and Validation Procedures

Data verification checks that data entered into a secondary (i.e., electronic) format match the source data, while *data validation* checks that the data make sense. While data entry and data verification can be conducted by personnel with a general familiarity of the data, the validation process requires in-depth knowledge about the project and all data collected.

The data manager and project leader collaboratively establish SOPs for verification and validation and the project leader or designee will validate the data after verification is complete. The project leader is also responsible for reviewing all data products and reports before they are released outside the network. The data and project leaders will evaluate the results of verification and validation and determine any procedural or data form revisions that may be indicated by the results. Technicians will follow the SOPs for verification of data, make required changes, and document those changes.

6.7.1 Methods for Data Verification

Data verification immediately follows data entry and involves checking the accuracy of the computerized records against the original source (usually hard copy field records), and identifying and correcting any errors. NCPN procedures are to verify *all* records entered against their original source. When the computerized data are verified as accurately reflecting the original field data, the paper forms are set aside for use later in the data validation process.

The following four verification methods will be used by NCPN for all project data:

- *Visual review at data entry.* The data entry technician verifies each record after input and immediately corrects any errors. This method is the least complicated since it requires no additional personnel or software. Its reliability depends entirely upon the person keying data and thus, is probably the least reliable data verification method.
- *Visual review after data entry.* All records entered during a data entry session are printed in a format that closely matches the original data source. Each data element on the printout is compared with the original values from the hard copy, preferably by a second person who did not perform the data entry. Errors are clearly marked and corrected in the database as soon after data entry as possible.
- *Summary queries and tallies.* Each project will have queries that can be run to detect broad errors such as duplicate, omitted, or unlinked records.
- *Visual review of spatial data.* Any spatial data that are collected as part of the project will be converted to GIS and visually inspected for accuracy (e.g., points located outside park boundaries, upland locations occurring next to water bodies).

6.7.2 Methods for Data Validation

Although data may have been correctly transcribed from original field notes or forms, they still might be inaccurate or illogical. For example, entries of stream pH of 25.0 or a temperature of 95°C in data files raise doubt about their accuracy, and such entries almost certainly are incorrect, whether or not they were properly transcribed from field forms. This process of reviewing computerized data for range and logic errors is called *validation*, and it can accompany data verification *only* if the reviewer has comprehensive knowledge about the data. Validation is a separate operation carried out *after* verification by a project specialist who can identify generic and specific errors in particular data types.

Invalid data commonly consist of slightly misspelled species names or site codes, the wrong date, or out-of-range errors in parameters with well defined limits (e.g., elevation). But more interesting and often puzzling errors are detected as unreasonable metrics (e.g., stream temperature of 70°C) or impossible associations (e.g., a tree 2 feet in diameter and only 3 feet high). These are *logic errors*. The discovery of logic errors has direct, positive consequences for data quality and provides important feedback to the methods and data forms used in the field. Histograms, line plots, and descriptive statistics can reveal possible logic and range errors.

Corrections or deletions of logical or range errors in a data set require notations in the original paper field records about how and why the data were changed. Modifications to the field records should be clear and concise while preserving the original data entries or notes. Validation efforts should also include a check for the completeness of a data set since field sheets or other sources of data could easily be overlooked.

General step-by-step instructions are not possible for data validation because each data set has its unique contents and domains. Specific procedures for data validation will be delineated in data management SOPs. However, the following general methods can be used as guidelines:

- *Data entry application programming.* Certain components of data validation are built into data entry forms. The simplest validation during data entry is range checking, such as ensuring that a user attempting to enter a pH of 20.0 gets a warning and the opportunity to enter a correct value between 1.0 and 14.0 (or within a narrow range appropriate to the study area). Not all fields, however, have appropriate ranges that are known in advance, so knowledge of what are reasonable data and a separate, interactive validation stage is important.

Edwards (2000) suggests the use of ‘illegal data’ filters, which check a specified list of variable value constraints on the master data set (or on an update to be added to the master) and create an output data set. This output data set includes an entry for each violation, along with identifying information and an explanation of the violation.

A caveat should be interjected regarding the operative word ‘illegal.’ Even though a value above or below a given threshold has never before been observed and the possibility that it could occur seems impossible, such an observation is not always an

illegal data point. Edwards (2000) points out that one of the most famous data QA/QC blunders to date occurred when NASA's computer programs deleted satellite observations of ozone concentrations that were below a specified level, seriously delaying the discovery of the ozone hole over the South Pole.

- *Outlier Detection.* According to Edwards (2000), “the term outlier is not (and should not be) formally defined. An outlier is simply an unusually extreme value for a variable, given the statistical model in use.” Any data set will undoubtedly contain some extreme values, so the meaning of ‘unusually extreme’ is subjective. The challenge in detecting outliers is in deciding how unusual a value must be before it can (with confidence) be considered ‘unusually’ unusual.

Data quality assurance procedures should not try to eliminate outliers. Extreme values naturally occur in many ecological phenomena; eliminating these values simply because they are extreme is equivalent to pretending the phenomenon is ‘well-behaved’ when it is not. Eliminating data contamination is perhaps a better way to explain this quality assurance goal. If contamination is not detected during data collection, it will be detected later only if an outlying data value results. When we detect an outlier, we should try to determine if some contamination is responsible.

GIS, database, graphic, and statistical tools for ad-hoc queries and displays of the data can be used to detect outliers. Some of these outlying values may appear unusual but prove to be quite valid after confirmation. Noting correct but unusual values in the documentation of the data set saves other users from checking the same unusual values.

- *Other exploratory data analyses.* Palmer and Landis (2002) suggest that in some cases, calculations for assessments of precision, bias, representativeness, completeness, and comparability may be applicable and that for certain types of measurements, evaluation of a detection limit may also be warranted. Normal probability plots, Grubb's test, and simple and multiple linear regression techniques may also be used (Edwards 2000).

6.8 Version Control

Version control is the process of managing copies of changing files over the course of a project. Change includes any alteration to the structure or content of the files, which should not be made without the ability to fully recover a data set as it existed before changes were made. Before making any major changes to a file, a copy of the file should be saved with a unique identification number. This process is particularly important when appending newly-validated data to a master data set, or when upgrading a database to a new version. In addition, proper controls and communication are required to ensure that only the most current version is for data entry or analysis.

Specific naming conventions and directory structures related to version control are detailed in individual monitoring SOPs. General file and version naming conventions are documented in Chapter 10.1.4, and typically include a combination of database version number (e.g., 2.03) and date. The data manager will determine the version control method that will be used, and other network personnel are responsible for accurately

designating versions for any files they have worked with. Backup routines can be built into the databases that allow for automatic file naming and archiving, and an index can provide a guide to versions.

6.9 Data Quality Review and Communication

Edwards (2000) suggests regular meetings of project leaders, the data manager, and data management personnel for discussing data quality problems and issues. Participants become more aware of quality issues and learn to anticipate problems. Moreover, all participants realize their role in data quality and the entire monitoring effort.

6.9.1 Value of Feedback from QA/QC Procedures

Quality assurance procedures may need revision to improve quality levels if verification and validation processes reveal an unacceptable level of data quality. Quality checks should not be performed with the sole objective of eliminating errors, as the results may also prove useful in improving the overall process. For example, if the month and day are repeatedly reversed in a date field, the data entry technicians may require retraining about the month/day entry order. If retraining is unsuccessful in reducing the error's occurrence, the computer program may need to be rewritten so that month and day are entered separately, field length limits are enforced, or a pick list is created. In this manner, the validation process will serve as a means of improving quality as well as controlling the lack of quality.

Field data forms can be modified to avoid common mistakes or logic errors. Often minor changes, small annotations, or adding check boxes to a field form can remove ambiguity about what to enter on the form. When the same type of validation error occurs repeatedly in different data sets, the field form—not the field crew—is usually at fault. Repeated errors found during validation can also mean that protocols or field training are at fault, which can then be recognized and corrected.

6.9.2 Monitoring Conformance to Plans and Standards

The data manager will perform periodic data audits to help maintain and improve NCPN's data quality. The audits will verify that staff are adhering to data quality procedures specified in this plan and the protocol-specific data management plans, and will track and facilitate the correction of any deficiencies. These quality checks promote a cyclic process of continuous feedback and improvement of the both the data and quality planning process.

Audits include verification of the following:

- Data collection and reporting requirements are being met
- Data collection and reporting procedures are being followed
- Verification and validation procedures are being followed
- Data file structures and maintenance are clear, accurate and according to plan
- Revision control of program documents and field sheets are adequate
- Calibration and maintenance procedures are being followed
- Seasonal and temporary staff have been trained in data management practice
- Metadata collection and construction for the program proceeds in a timely manner

- Data are being archived and catalogued appropriately for long term storage

The results of quality assessments are documented and reported to the research staff and the network coordinator. The project leader and coordinator are responsible for ensuring that non-conformities in data management practices are corrected.

6.9.3 Communicating Data Quality

NCPN will use data documentation and metadata to notify end users, project leaders, and network management of project data quality. A descriptive document for each data set or database will provide information on the specific QA/QC procedures applied and the results of the review.

Credits

This chapter was adapted from material prepared by Debbie Angell (Sonoran Desert Network).

CHAPTER 7. Data Documentation

Data documentation is the most important step toward ensuring that data sets are useable well into the future. Data longevity is roughly proportional to the comprehensiveness of their documentation (Michener 2000).

The term *metadata* is defined as information about the content, context, quality, structure, accessibility, and other characteristics of data. In addition to ensuring data longevity, metadata increase the possibility of data sharing and reuse for multiple purposes. Creating and maintaining comprehensive metadata is neither a simple nor quick process. It requires an up-front time investment for planning and organization, and an ongoing investment to keep it current.

While the importance of metadata is widely accepted within the data management community, the approaches for storing this information and the levels of detail can vary. However, some established metadata strategies apply to National Park Service data, including the following:

- Executive Order 12906, signed by President Clinton in 1994, mandates federal agencies to “...document all new geospatial data it collects or produces, either directly or indirectly...” using the Federal Geographic Data Committee (FGDC) [Content Standard for Digital Geospatial Metadata](#) (CSDGM). In addition, EO 12906 directs agencies to plan for legacy data documentation and provide metadata and data to the public.
- The FGDC [Biological Data Profile](#) contains all the elements of the CSDGM plus additional elements for describing biological data sets. Metadata created in compliance with the Biological Data Profile can be added to the [National Biological Information Infrastructure](#) (NBII) Clearinghouse. Although not a requirement, completion of the Biological Data Profile for appropriate data sets is recommended by NBII.
- The National Park Service (NPS) Geographic Information System (GIS) Committee requires all GIS data layers be described with FGDC standards and the [NPS Metadata Profile](#).

7.1 NPS Integrated Metadata System Plan and Tools

Of the numerous tools available for developing metadata, the [NPS Integrated Metadata System Plan](#) recommends three desktop applications for storing metadata. These include Dataset Catalog (developed by the national I&M Program), and two commercial metadata tools: ArcCatalog and SMMS. These tools are briefly described, below. Figure 7-1 illustrates how these applications are incorporated into the Integrated Metadata System.

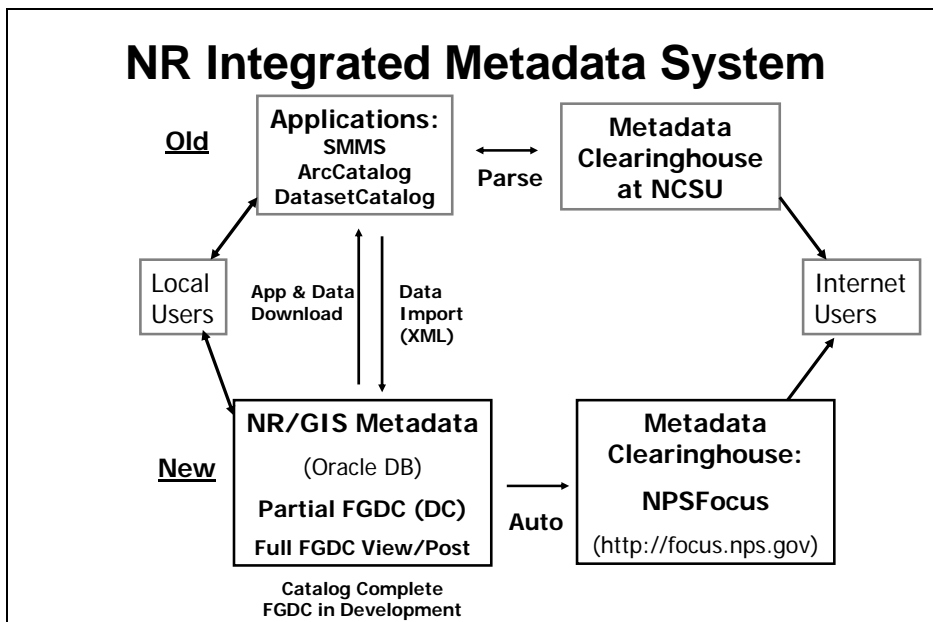


Figure 7-1. NPS Natural Resource (NR) Integrated Metadata System. Modified from I&M Data Management Conference, March, 2004.

This integrated approach (currently under development) uses existing desktop metadata creation applications, as well as an online integrated metadata database (NR-GIS Metadata) and a web-based data server (NR-GIS Data Server). [NR-GIS Metadata and Data Store](#) will comprise a web-based system to integrate both data dissemination and metadata maintenance. It will be possible to update Dataset Catalog records in the NR-GIS Metadata database or in the source desktop application (i.e., ArcCatalog, Dataset Catalog, SMMS). Non-sensitive NR-GIS Metadata records are automatically posted to [NPS Focus](#).

7.1.1 Dataset Catalog

[Dataset Catalog](#) is a tool for cataloging abbreviated metadata on spatial and tabular data sets pertaining to park units or networks. While Dataset Catalog is not intended to be a complete metadata tool, it does assist parks and networks in beginning to meet the mandates of EO 12906. With the current version of Dataset Catalog (version 2.1), records can be exported in Extensible Markup Language (XML).

NCPN has used Dataset Catalog for documenting non-spatial datasets created by the network and by network parks. Appendix C (NCPN user guidelines for Dataset Catalog) presents a Dataset Catalog user guide developed by NCPN, which documents procedures and standards for creating Dataset Catalog records. In 2006, the network will begin migrating Dataset Catalog records to the NR-GIS metadata system, which will provide a single access point for both geospatial and non-geospatial data set.

7.1.1 ArcCatalog

[ArcCatalog](#) is contained within the ArcGIS suite of applications and supports several metadata standards that allow users to create, edit, and view information about the data. Metadata within ArcCatalog are stored exclusively as XML files. The NPS Integrated

Metadata System Plan recommends ArcCatalog for geospatial metadata. In addition, NPS has developed the [NPS Metadata Tools and Editor](#), which can be used in two ways: as an extension within ArcCatalog; or as a standalone desktop interface. The application is intended to be the primary editor for metadata that will be uploaded to the NR-GIS Data Store. This tool also includes NBII Biological Profile editing capability, which is an essential metadata component for inventory and monitoring data sets produced by the network.

7.2 Metadata Process and Work Flow

Data used or documented by NCPN can be grouped into three broad categories based on data origin: NCPN project data; other National Park Service data; and data from external (non-NPS) sources. The level and extent to which metadata can be completed varies depending on these data categories, as does the work flow process.

- *NCPN Project data* – These are projects undertaken by the NCPN and metadata considerations begin at the onset of the project. Complete and compliant metadata are required for each project.
- *Other NPS data* – This category includes natural resource-related data sets typically obtained during the data mining process at parks. In many cases, legacy datasets are missing pertinent information, including the originator who may no longer be in contact. While the desirable level of documentation may not be possible, all available data and supporting documentation are assembled and reviewed.

Ongoing resource management projects in network parks are the source of many valuable natural resource-related data sets. While many of the data sets from these projects have associated documentation or knowledgeable project managers who are still at the parks, well-structured and compliant metadata are frequently not created or maintained.

- *External Data* - Other agencies and organizations gather data that are relevant to NCPN or park projects. If NCPN obtains these data sets it also obtains, to the extent possible, all available metadata. As with legacy data, gaps may exist in non-programmatic data documentation.

7.2.1 Dataset Catalog Use

Dataset Catalog provides concise metadata for park or network data sets in a searchable, centralized location. These records can be imported into the online NR-GIS Metadata System.

- NCPN will create a Dataset Catalog record for legacy and current park natural resource-related tabular data sets that are housed, managed, or directly accessible by the park. The catalog record is used for long-term documentation of the data, and as a means of searching, sorting, and printing information on park data sets.

- NCPN will create a Dataset Catalog record for all data sets created or sponsored by the network (e.g., inventory or monitoring data sets, NCPN photo management database).
- NCPN will create a Dataset Catalog record for all external data sets that are regularly contributed to by parks (e.g., water quality data, breeding bird surveys), and for non-programmatic data sets that are downloaded and managed locally by parks or the network (e.g., certain climate data sets).

As a general rule, if a data set exists primarily in tabular format (e.g., MS-Access database, Excel spreadsheet, assemblages of paper or other materials), Dataset Catalog is used as the metadata tool. If a data set exists primarily in spatial format (e.g., GIS coverage or shapefile of trails, boundaries), ArcCatalog is used (see below). If both spatial and tabular components comprise a data set, both Dataset Catalog and ArcCatalog are used and cross-references each other.

For example, an extensive MS-Access database containing the results of a two-year mammal inventory is provided to NCPN. Accompanying the database are shapefiles containing spatial data on trapline and capture locations. In this instance a Dataset Catalog record is created that documents the project and the database, and the spatial data are referenced in the Dataset Catalog record under “related data.” The project shapefiles are then fully documented using ArcCatalog, and the Dataset Catalog record is referenced in FGDC Section 1.2 (“Supplemental Information”) of the ArcCatalog metadata record.

7.2.2 ArcCatalog Use

ArcCatalog is the tool used by NCPN and its network parks for creating FGDC-compliant spatial metadata. All metadata will be written using ArcCatalog (and the NPS Metadata Tools extension), and will be stored as both .xml and .txt files.

- NCPN will create a metadata record within ArcCatalog for legacy and non-programmatic data spatial sets to the extent possible, which will detail all that was known about the data at the time they were obtained (e.g., date, data source, contact information, and any documentation the source provider knew regarding the dataset.) This narrative is written in the Abstract portion of the metadata, where it is easily viewable to the end user.
- NCPN will assist parks, to the extent possible or needed, in creating FGDC-compliant metadata for newly-created or ongoing park spatial data.
- NCPN will ensure that FGDC-compliant metadata, including the Biological Profile, is created for all spatial data created by the network in the course of its work. For projects that are completed by cooperators, the cooperators are responsible for writing FDGC-compliant metadata for all spatial data submitted, which NCPN will review.

7.2.3 Making Information Available

Dataset Catalog and ArcCatalog metadata will be submitted to the NR-GIS Metadata and Data Store. Dataset Catalog records will also be provided to park resource managers on an annual basis in both electronic and hard-copy format. NCPN project metadata will also be posted on the NCPN website. Metadata records may be withheld from public posting, or may be abridged, if their content is classified as sensitive and their release could potentially jeopardize a protected resource (see Chapter 9, Data Dissemination).

7.2.4 Updating Metadata Records

For NCPN projects, the project leader is required to keep the data manager and GIS specialist informed of any data or format changes so that associated metadata can be verified and updated.

7.3 Metadata for Inventory Projects

Databases developed for inventory projects completed by the network will contain a table, derived from the Dataset Catalog, which provides basic metadata for the project (Figure 7-2). Embedding the table and an associated form within the database ensures that metadata are inseparable from the data, and provides added assurance of documentation in the event Dataset Catalog records are unavailable. NCPN is providing this template to network parks, and is encouraging them to include the table and form in databases they develop at the park level.

7.4 Vital Signs Metadata

7.4.1 Master Version Table

Vital signs protocols (protocol narrative and accompanying SOPs) constitute essential project documentation that must accompany the distribution of monitoring data. Over time there will be instances when the protocol narrative and SOPs will need to be updated. Narrative and SOP updates may occur independently. That is, a change in one SOP will not necessarily invoke changes in other SOPs; a narrative update may not require SOP modifications. NCPN tracks the narrative and SOP version numbers in a Master Version table (MVT). The MVT contains a Version Key Number that designates the narrative and SOP versions that are in use at a specific time (Table 7-1).

Every protocol contains an SOP entitled “Revising the Protocol Narrative and SOPs.” The Master Version Table is contained in this SOP and is required to be updated when any protocol revisions are made. The protocol narrative, SOPs, and data should not be distributed independently of the Master Version Table.

The screenshot shows a web-based form titled "Metadata entry form" for "The National Park Service Inventory & Monitoring Northern Colorado Plateau Network". The form is divided into several sections: "Project Name", "Purpose", "Abstract", "Subject" (with a dropdown menu), "Keywords", "Project #", "Permit #", "Update Frequency", "Data Status", and "Progress". Each section has a corresponding input field. At the bottom, there is a "Record:" navigation bar showing "1 of 1" records. A note at the bottom of the form states: "Note: Hold cursor over captions for brief descriptions".

Figure 7-2 . Metadata form included in completed NCPN inventory project databases.

A network database, `master_version_table.mdb`, centralizes version information for all protocols. Any revisions to the MVT in “Revising the Protocol Narrative and SOPs” must be conveyed to the network data manager so the database can be updated. All monitoring databases are linked to `master_version_table.mdb`. Through this link, monitoring data are directly associated with information on the protocol versions in effect at the time of data acquisition. Specifically, the Version Key Date cross-walks to the acquisition date stored in individual databases. This link ensures that this information does not become separated from the data.

Table 7-1. Example of the Master Version Table used to track changes in vital signs protocol narrative and SOPs in the project protocol.

Version Key #	Version Key Date	Narrative	SOP #1	SOP #2	SOP #3	SOP #4	SOP #5	SOP #6	SOP #7
VK1	12-15-2004	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
VK2	5-10-2005	1.00	1.01	1.01	1.00	1.01	1.00	1.00	1.01
VK3	11-18-2005	1.00	1.01	1.01	1.10	1.01	1.00	1.00	1.01

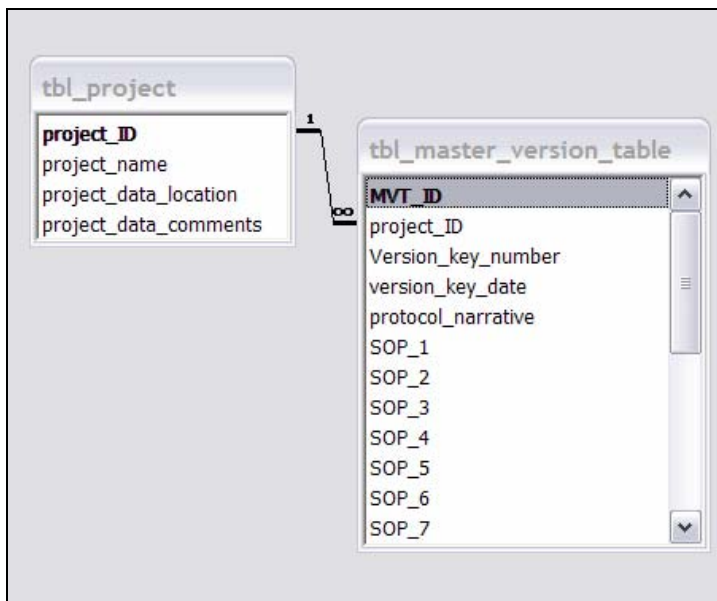


Figure 7-3. Structure of Master Version Table database. Not all possible SOP numbers are shown.

7.4.2 Additional Vital Signs Metadata

Long-term monitoring projects present a different set of metadata questions and requirements that may extend beyond the scope of established FGDC standards. Depending on the project, documentation may need to include details on data models or algorithms used, procedures for data synthesis, and associated input and output files. Data use and data request histories, and secondary research or publications resulting from long-term monitoring projects, may also need to be tracked.

Michener (2000) indicates that metadata standards specifically for non-geospatial ecological data do not exist in any accepted format, and it is unlikely that a single metadata standard could encompass all types of ecological data. Michener proposes a generic set of metadata descriptors that could serve as a template for more refined subject- or project-specific metadata guidelines. The five broad classes of metadata descriptors he identifies are:

1. *data set descriptors*: basic attributes of data set
2. *research origin descriptors*: all relevant metadata that describe the research leading to the genesis of a particular data set (i.e., hypotheses, site characteristics, experimental design and research methods)
3. *data set status and accessibility descriptors*: status of the data set and associated metadata, as well as information related to data set accessibility
4. *data structural descriptors*: all attributes related to the physical structure of the data file
5. *supplemental descriptors*: other related information that may be necessary for facilitating secondary usage, publishing the data set, or supporting an audit of the data set.

Numerous and detailed subclasses are contained within each class. For example, for Class 5, supplemental descriptors, Michener includes items such as: computer programs and

data processing algorithms; redundant archival sites; publications and results; and a history of data set use (Table 7-2).

Much of the metadata outlined by Michener is included in FGDC metadata standards, monitoring protocol narratives and SOPs, and in databases NCPN is developing to track data errors submitted and web-based data downloads. However, some essential documentation such as algorithms, output files, or spatial analyses may reside in different systems and formats at NCPN, and could potentially be overlooked when distributing or applying the data.

Table 7-2. Example of ecological metadata descriptors for one of five metadata classes (Michener 2000).

Class V: Supplemental Descriptors	
A. Data acquisition	
1. data forms or acquisition methods	Descriptions or examples of data forms, automated data loggers, digitizing procedures, etc.
2. locations of completed data forms	Physical location (address, building, room number)
3. data entry verification procedures	Procedures employed to verify that digital data set is error-free
B. Quality assurance/quality control procedures	Identification and treatment of outliers, description of quality assessments, calibration of reference standards, equipment performance results, etc.
C. Supplemental materials	References and locations of maps, photographs, videos, GIS data layers, physical specimens, field notebooks, comments, etc.
D. Computer programs and data processing algorithms	Description or listing of any algorithms or software used in deriving, processing or transforming data.
E. Archival	
1. archival procedures	Description of how data are archived for long-term storage and access.
2. redundant archival sites	Locations and procedures followed to provide redundant copies as a security measure
F. Publications and results	Electronic reprints, listing of publications resulting from or related to the study, graphical or statistical data representations, primary WWW site(s) for data and project
G. History of data set usage	
1. data request history	Log of who requested data, for what purpose, and how it was actually used
2. data set update history	Description of any updates performed on data set
3. review history	Last entry, last researcher review, etc.
4. questions and comments from secondary users	Questionable or unusual data discovered by secondary users, limitations or problems encountered in specific applications of the data, unresolved questions or comments.

In 2006, NCPN will assess all aspects of project documentation, identify additional metadata needs, and determine how to merge the pieces into an integrated vital signs metadata system. Goals of this system will include:

- compliance with FGDC metadata standards
- easy access, updating, and retrieval of metadata
- ability to provide metadata in a platform-independent format
- development of standardized procedures to eliminate documentation oversights or gaps
- use of existing metadata tools as much as possible.

NCPN will also work with other networks to determine if they have similar metadata needs, and if collaboration would be beneficial.

Credits

Sections 7.1 and 7.2 were adapted from material prepared by Bill Moore and Teresa Leibfried (Cumberland-Piedmont Network).

CHAPTER 8. Data Summary and Reporting

8.1 Vital Signs Reporting

The long-term success of the Northern Colorado Plateau Network (NCPN) is dependent on providing the information parks need to make sound, science-based decisions on managing natural resources. In addition, making our information available to other agencies and organizations, researchers, and the general public, is essential.

Each vital sign protocol establishes requirements for data summary, analysis and reporting. Queries and reports are integrated into the reporting function of most vital signs databases. Vital sign protocols also include spatial data analysis as an essential component of data reporting. The graphical presentation of locations, spatial relationships, and patterns of change over time can be powerful tools for both analyzing data and communicating results to a broad audience.

The primary role of data management staff is to prepare data as needed for analysis and reporting, in coordination with the project leader.

8.1.1 Reporting Process

All data sets will go through a similar process as they move from data tables, to analysis, to final reports and public distribution. After data entry is completed for a season or year, data will be verified and validated. Project leaders are then responsible for analyzing the data, preparing a summary of findings, and reporting on the project. In limited cases, such as with climate, data management staff perform some of these functions. The report and annual data set are then archived at NCPN, and are posted in the appropriate locations for public access (see Chapter 9).

In addition to annual reports, periodic protocol review reports will also be produced by the network. Within the first three years of protocol implementation, and thereafter every five years, the overall quality of the protocol will be evaluated in terms of its implementation, effectiveness, and compliance with data management standards.

Table 7-1 in Chapter 7 of the network's *Plan for Natural Resources Monitoring* (O'Dell et al. 2005) outlines in detail the network's analysis and reporting schedule and procedures, including the associated roles and responsibilities.

As the NCPN monitoring program develops, this chapter of the Data Management Plan will serve as a timeline and guide for the data management staff on established reporting schedules and procedures. The preliminary draft reporting table (Table 8-1) will be further developed and updated to reflect additions and changes to reporting requirements and procedures.

8.2 Other Reporting

While reports on vital signs will constitute the majority of the reporting tasks, summaries of data that are managed in national Inventory and Monitoring (I&M) databases will also be provided to parks on a regular basis. The data compiled in NatureBib, Dataset Catalog, and NPSpecies are accessible via their respective websites; however, formatted and printed reports help ensure the information is on-site at parks, in a format accessible to all, and easy to review.

Table 8-1. Preliminary draft of data management reporting schedule. Details of schedule, including tasks specific to each protocol, will be completed as monitoring program is implemented.

Type of Report	Frequency	Data Requirements
Vital Signs Reports		
Initial Protocol Reviews	Within 1-3 years	Review and document compliance with data entry, QA/QC, retrieval and archiving standards. Correct data management flaws
Annual Reports for specific protocols	Annual	Database queries and reports per specifications from project leader. Provide number of samples and sites, relevant attributes. Document data management activities (e.g., database updates, QA/QC changes)
Comprehensive analysis and synthesis reports	Every 3-5 years	Database queries and reports per specifications from project leader
Subsequent protocol reviews	Every 5 years	Review and document compliance with protocols. Refine data management procedures
Program review reports	Every 5 years	Evaluate effectiveness of reports, ability to share data, utility of data products
Journal articles, book chapters, white papers	variable	Document and communicate findings and advances in data management
Symposia, workshops, conferences	variable	Present information on specific topic or subject area. Identify emerging issues and new ideas, document and communicate findings
Other Scheduled Reports		
Dataset Catalog Report	Biennial: alternate 8 parks per year	Ensure that data mining is up-to-date at recipient parks. Format and print hard copy summaries of Dataset Catalog records for each park.
NPSpecies Report	Annual: all parks	Ensure that new data are entered into NPSpecies. Format and print updated vertebrate and vascular plant species lists for each park
NatureBib Report	Biennial: alternate 8 parks per year	Ensure that data mining up-to-date at recipient parks. Format and print hard copy bibliography of park references in NatureBib.

CHAPTER 9. Data Dissemination

One of the most important goals of the Inventory and Monitoring (I&M) Program is to integrate natural resource inventory and monitoring information into National Park Service (NPS) planning, management, and decision making. Title II of the National Parks Omnibus Management Act of 1998 (P.L. 105-391) specifically encourages the publication and dissemination of information derived from studies in the National Park Service, as well as cooperation with other federal monitoring and information collection efforts.

To accomplish this goal, procedures must be in place to ensure that data collected, developed, or assembled by NCPN staff and cooperators are made available for decision-making, research, and education. Providing well-documented data in a timely manner to park managers is especially important to the success of the program. NCPN must ensure that:

- data can be easily found and obtained
- data not subjected to full quality control are not released
- data are accompanied by complete metadata
- sensitive data are identified and protected from unauthorized access and distribution

NCPN will use a number of distribution methods that will allow information collected and developed as part of the program to become widely available to park staff, the public, and other potential users.

9.1 National Park Service Policy on Data Ownership

Data distribution procedures must first be set in the context of NPS policies. The National Park Service defines conditions for the ownership and sharing of collections, data, and research funded by the United States government. All cooperative and interagency agreements, volunteer agreements, and contracts should include clear provisions for data ownership and sharing as defined by the National Park Service:

- All data and materials collected or generated using National Park Service personnel and funds become the property of the National Park Service.
- Any important findings from research and educational activities should be promptly submitted for publication. Authorship must accurately reflect the contributions of those involved.
- Investigators must share collections, data, results, and supporting materials with other researchers whenever possible. In exceptional cases, where collections or data are sensitive or fragile, access may be limited.

The Office of Management and Budget (OMB) ensures that grants and cooperative agreements are managed properly, and that federal funding is disbursed in accordance with applicable laws and regulations. OMB circulars establish some degree of government-wide standardization to achieve consistency and uniformity in the development and administration of grants and cooperative agreements. Specifically, OMB Circular A-110 establishes property standards within cooperative agreements with higher institutions and non-profit organizations. Section 36 of Circular A-110, “Intangible Property” describes the following administrative requirements pertinent to data and ownership:

(a) The recipient (higher institution or non-profit organization receiving federal monies for natural resource inventory and/or monitoring) may copyright any work that is subject to copyright and was developed, or for which ownership was purchased, under an award. The Federal awarding agency(ies) (in this case the National Park Service) reserve a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use the work for Federal purposes, and to authorize others to do so.

Section 36 also states:

(c) The Federal Government has the right to:

(1) obtain, reproduce, publish or otherwise use the data first produced under an award

(2) authorize others to receive, reproduce, publish, or otherwise use such data for Federal purposes

(d) (1) In addition, in response to a Freedom of Information Act (FOIA) request for research data relating to published research findings produced under an award that were used by the Federal Government in developing an agency action that has the force and effect of law, the Federal awarding agency shall request, and the recipient shall provide, within a reasonable time, the research data so that they can be made available to the public through the procedures established under the FOIA. If the Federal awarding agency obtains the research data solely in response to a FOIA request, the agency may charge the requester a reasonable fee equaling the full incremental cost of obtaining the research data. This fee should reflect costs incurred by the agency, the recipient, and applicable subrecipients. This fee is in addition to any fees the agency may assess under the FOIA (5 U.S.C. 552(a)(4)(A)).

(2) The following definitions apply for purposes of paragraph (d) of this section:

(i) Research data is defined as the recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This "recorded" material excludes physical objects (e.g., laboratory samples)...

(ii) Published is defined as either when:

- (A) Research findings are published in a peer-reviewed scientific or technical journal; or
- (B) A Federal agency publicly and officially cites the research findings in support of an agency action that has the force and effect of law.
- (iii) Used by the Federal Government in developing an agency action that has the force and effect of law is defined as when an agency publicly and officially cites the research findings in support of an agency action that has the force and effect of law.

9.1.1 Establishing Data Ownership Guidelines

To ensure that proper ownership, format, and development of network products is maintained, all cooperative or interagency work must be conducted as part of a signed collaborative agreement. Every cooperative agreement, interagency agreement, or contract involving NCPN must have the following citation from OMB Circular A-110 under a *Reports and Deliverables* section:

“As the performing organization of this agreement, institution or organization name shall follow the procedures and policies set forth in OMB Circular A-110.”

In addition, every cooperative agreement, interagency agreement, or contract must include a list of deliverables and products clearly defined within each agreement or contract. Details on required formatting and media types must be included. Agreements and contracts must also list all products expected to result from the project. These include, but are not limited to, field notebooks, photographs (hardcopy and digital), specimens, raw data, and reports.

NPS should also provide a schedule of deliverables that includes sufficient time for NPS to review draft deliverables before the scheduled final submissions.

9.2 Data Distribution

NCPN’s main mechanism for distribution of the network’s inventory and monitoring data will be the Internet, which will allow data and information to reach a broad community of users. Both network-level and national-level web-based applications and repositories have been developed to store natural resource information (Table 9-1). The network will use the following web-based tools to distribute data acquired or documented by the program:

- **NatureBib** – a web-based database housing natural resource bibliographic data for I&M Program parks ([NatureBib Home Page](#)). This site has a user interface for searching by author, title, or subject, and also provides links and download capability for full-text documents. NCPN will obtain or scan electronic versions of documents whenever possible for posting on this site, after verifying that no copyright infringement occurs in the process.
- **NPSpecies** – a web-based database to store, manage and disseminate information on the status of organisms known or suspected to occur in National Park Service

units ([NPSpecies Home Page](#)). Information includes data on species status, abundance, residency, nativity, vouchers, observations, and links to supporting references via NatureBib (see above).

- **Biodiversity Data Store** – a digital archive of documents, GIS datasets and non-GIS dataset files that document the presence/absence, distribution and/or abundance of taxa in National Park Service units ([Biodiversity Service Center Home Page](#)).
- **Natural Resource and GIS (NR-GIS) Metadata and Data Store** – an online repository for spatial and non-spatial metadata and associated data products. ([NR-GIS Metadata and Data Store Home Page](#)) The NR-GIS Metadata Database is a repository of and search engine for metadata describing natural resource and GIS data. The NR-GIS Data Server hosts natural resource and GIS data (documented by the metadata in the NR-GIS Metadata Database) for download.
- **Northern Colorado Plateau Network Website** – a source of detailed information about the network and its program. Data and products will either be available through the site, or users will be directed to where the data are stored. Metadata on all inventory and monitoring products developed as part of the Network’s I&M plan will also be posted to this site. Appendix M (NCPN internet and intranet website management) provides details on the NCPN website structure, configuration, and management.

Table 9-1. Data that will be provided on the NCPN and national I&M websites

Web Application Name	Data types available at site
NPSpecies	Vascular plant and vertebrate species known or suspected to occur on NPS park units
NatureBib	Bibliography of park-related natural resource information
NPSFocus	Portal to a variety of NPS information sources; will include NatureBib and NR/GIS Data Store links
Biodiversity Data Store	The raw or manipulated data and products associated with Inventory and Monitoring data that have been entered into NPSpecies.
NR-GIS Metadata and Data Store	Park-related metadata and selected data sets (spatial and non-spatial)
NCPN Website	Reports and metadata for NCPN projects; certified species lists; search tools for climate data; data downloads

9.3 Data Classification: protected vs. public

All data and associated information from I&M activities will be assessed to determine their sensitivity. This includes but is not limited to reports, metadata, raw and manipulated spatial and non-spatial data, maps, etc. Network staff will carefully identify any information that is considered sensitive, and will manage those data needing access restrictions and those to make publicly available.

The Freedom of Information Act, 5 U.S.C. § 552 (FOIA), stipulates that the United States Government, including the National Park Service, must provide access to data and information of interest to the public. FOIA, as amended in 1996 to provide guidance for electronic information distribution, applies to records that are owned or controlled by a federal agency, regardless of whether or not the federal government created the records. FOIA is intended to establish a right for any person to access federal agency records that are not protected from disclosure by exemptions. Under the terms of FOIA, agencies must make non-protected records available for inspection and copying in public reading rooms and/or the Internet. Other records, however, are provided in response to specific requests through a specified process. The Department of the Interior's revised FOIA regulations and the Department's Freedom of Information Act Handbook can be accessed at <http://www.doi.gov/foia/> for further information. Additional information is provided in Appendix L (Summary of laws and policy related to the Freedom of Information Act).

In some cases, public access to data can be restricted. Under one Executive Order (No. 13007: Indian Sacred Sites), Director's Order #66, the National Parks Omnibus Management Act (16 U.S.C. 5937), the National Historic Preservation Act (16 U.S.C. 470w-3), the Federal Cave Resources Protection Act (16 U.S.C. 4304) and the Archaeological Resources Protection Act (16 U.S.C. 470hh), the National Park Service is directed to protect information about the nature and location of sensitive park resources. Through these regulations, information that could result in harm to natural resources, including endangered or threatened species, can be classified as 'protected' or 'sensitive' and may be withheld from public release.

The following guidance for determining whether information should be protected is suggested in the draft Director's Order #66:

- Has harm, theft, or destruction occurred to a similar resource on federal, state, or private lands?
- Has harm, theft, or destruction occurred to other types of resources of similar commercial value, cultural importance, rarity, or threatened or endangered status on federal, state, or private lands?
- Is information about locations of the park resource in the park specific enough so that the park resource is likely to be found at these locations at predictable times now or in the future?
- Would information about the nature of the park resource that is otherwise not of concern permit determining locations of the resource if the information were available in conjunction with other specific types or classes of information?
- Even where relatively out-dated, is there information that would reveal locations or characteristics of the park resource such that the information could be used to find the park resource as it exists now or is likely to exist in the future?
- Does NPS have the capacity to protect the park resource if the public knows its specific location?

Management of resource information that is sensitive or protected requires the:

- Identification of potentially sensitive resources
- Compilation of all records relating to those resources
- Determination of what data must not be released to the public
- Management and archiving of those records to avoid their unintentional release

Classification of sensitive I&M data will be a shared responsibility that includes network staff, park resource management staff, park superintendents, and investigators working on individual projects. In 2005, NCPN will complete a decision tree process that will help standardize the designation of sensitive data, and ensure that comparable guidelines are used for all parks. The decision tree should also reduce the potential for unwarranted personal bias in the classification process, and provide documentation for the rationale behind sensitive status designations.

The network staff is also responsible for identifying all potentially sensitive materials and information from principal investigators working on a project. The investigators, whether network staff, park staff, or partners, will develop procedures to flag all sensitive materials in project products, including documents, maps, databases, and metadata. When submitting products or results, investigators should specifically identify records and other references as being sensitive. Cooperators should consult with network staff to determine if information is classified as sensitive or protected before releasing it in a public forum.

Information may be withheld regarding the nature and/or specific locations of the following resources recognized as ‘sensitive’ by the National Park Service:

- Endangered, threatened, rare, or commercially valuable National Park Service resources (species and habitats)
- Mineral or paleontological objects
- Objects of cultural patrimony
- Significant caves

Note that information already in the public domain can, in general, be released to the public domain. For example, the media has reported in detail the return of condors to the Grand Canyon. If an individual requests site-specific information about where the condors have been seen, this information, in general, can be released. However, the locations of specific nest sites cannot be released.

9.3.1 Access Restrictions on Sensitive Data

For each project, the network data manager will provide a list of potentially sensitive information to the park resource manager for review. The resource manager then determines which information should be protected. Resource managers will be responsible for working with park superintendents in this process.

When preparing or uploading information into any network or national database, network staff ensures that all protected information is properly identified and marked. The network staff ensure that all references to protected information are removed or obscured in reports, publications, maps, or other public forum.

Network staff will remove sensitive information from public versions of documents or other media. The main distribution applications and repositories developed by the I&M Program (see Section 9.2.1.) are maintained on both secure and public servers, and all records that are marked ‘sensitive’ during uploading will only be available on the secure servers. Abridged records will be available on public servers.

9.3.2 Public Access to Network Inventory and Monitoring Data

According to FOIA (specifically the 1996 amendments), all information routinely requested must be made available to the public via reading rooms and/or the Internet. Network project data will be available to the public at one or more internet locations:

- The Northern Colorado Plateau Network web site
- Public servers for the NPSpecies, NatureBib, and NPSFocus databases
- Public server for the Biodiversity Data Store
- Public server for the NR/GIS Data Store

The Network will regularly provide updated information about inventories and monitoring projects, including annual reports and detailed project reports through the network web site. Information on species in the network, including all records generated through the Inventory and Monitoring Program, will be maintained and accessible through the NPSpecies database. Bibliographic references that refer to National Park Service natural resources will be accessible through the NatureBib database. Documents, maps, and data sets containing resource information from all sources, and their associated metadata, will be accessible through the Biodiversity Data Store and/or NR/GIS Data Store. Each of these databases or repositories will be accessible via both a secure server and a public server. The public can access all information in these databases except those records marked as ‘sensitive.’

9.3.3 Data Availability

Tabular data and reports

Data resulting from the network’s inventory and monitoring projects will be fully documented with FGDC-compliant metadata and made available to the public via the network’s website. The metadata for all datasets will be made available to the public as soon as they are verified by the project managers.

Datasets for short-term studies (inventories) will be provided to the public on the NCPN website, two years following the year the data were collected or following publication of the investigator’s results, whichever comes first. Long-term (monitoring) studies will be provided to the public in four or five year intervals, or when trend analyses have been reported by the network. This will be specific to each monitoring protocol. Before data are posted, the project leader will verify the final dataset and metadata, if necessary.

NCPN staff will notify investigators before making data sets available to the public. This will allow each investigator the opportunity provide a written request to further restrict

public access to the dataset. Network staff will review the investigator's request and determine whether the request will be granted and the duration of the restriction.

GIS data

While each park will receive all data from network projects, not all data will need to be posted on the GIS clearinghouse. Most base data are already posted, and new base data collected or updated by the network (e.g., trails, roads) will be available for uploading to the clearinghouse.

As NCPN creates datasets for the 12 Basic Resource Inventories, the resulting GIS layers, depending on sensitivity, will be available for downloading (e.g., vegetation maps, soil maps, weather data, hydrologic data). NCPN does not intend to post data locating monitoring sites (vegetation, riparian, soil, rain/temperature gauges, etc.) unless at a park's request.

Ad-hoc requests for data

There may be instances where a requester needs data in a specialized format, or where the products available from websites are not sufficient for the requester's use. NCPN will make every effort to accommodate these requests, and to ensure that users of network data can acquire them in the formats they need.

9.3.4 Data Acquisition Policy

All downloadable data sets available on the NCPN website will be accompanied by the network's acquisition policy, which will include:

- A web-based form to be completed before acquiring data. This form will allow network staff to maintain a distribution log specifying the recipient's name and contact information, intended use of data, export file format, delivery date and method, and a description of the data content. If data problems or anomalies are detected, this log will allow the network to contact secondary data users and inform them of such problems or corrections.
- A statement about the use and appropriate citation of data in resulting publications
- A request that acknowledgement be given to the National Park Service Inventory and Monitoring Program in all resulting reports and publications

All data sets with public access available on the NCPN website will be accompanied by the Network's acquisition policy.

9.4 Data Feedback Mechanisms

The NCPN website will provide an opportunity for NPS staff, cooperators and the public to provide feedback on data and information gathered as part of the network's I&M Program. A "contact us" link will be provided on navigation bars of the site, and an general questions and comments about the Network's program and projects. A more "errors or corrections notification" link directs comments to the NCPN staff pertaining to errors found in website-accessible data.

9.4.1 Data Error Reporting Procedures

The following procedures describe the process that NCPN will use to receive and verify data errors identified by public and private data users:

- Data users send in notification (via the NCPN website, email, or other written means) of an alleged error. NCPN staff then replies with an acknowledgment.
- NCPN staff enters the information into a central data edit log table developed by the network and residing on the network server.
- On a monthly basis NCPN evaluates errors, determines if the data in questions are correct or incorrect, and decides on the action to take (no action; action deferred; immediate action). Actions and their justification are noted in the data edit log.
 - If the data are correct, then the network staff replies that no corrections are to be made and the information stands.
 - If the data are incorrect, the network staff makes the appropriate corrections and notifies the original data collectors (e.g., cooperator, other agency, park staff). The network also notifies other users (as determined through the user log), of corrections to the data set.
- Once data are corrected, the network website will be refreshed with the corrected information.
- A summary log of edits will be available through a link on the network website.

Credits

This chapter was adapted from material prepared by Sara Stevens (Northeast Coastal and Barrier Network) and Wendy Schumacher (NPS Washington Office).

CHAPTER 10. Data Maintenance, Storage and Archiving

This chapter describes procedures for the long-term management and maintenance of digital data, documents, and objects that result from Northern Colorado Plateau Network (NCPN) projects and activities. The overall goals of these procedures are:

- to avert the loss of information over time
- to ensure that network information can be easily obtained, shared, and properly interpreted by a broad range of users.

Effective long-term data maintenance is inseparable from proper data documentation, and an essential part of any archive is accompanying explanatory materials (Olson and McCord 1998). This chapter will refer to, and in some cases elaborate on, metadata standards and dataset documentation procedures that are more fully explained in Chapter 7 (Data Documentation) of this plan.

10.1 Digital Data Maintenance

In general, digital data maintained over the long term will be one of two types: short-term data sets, for which data collection and modification have been completed (i.e., inventory projects); and long-term monitoring data sets, for which data acquisition and entry will continue indefinitely.

Following the lead of the National Park Service (NPS) and the national Inventory and Monitoring (I&M), Program, NCPN has adopted MS-Access as its database standard and ArcGIS as its spatial data management standard. NCPN will remain current and compatible with NPS or national I&M version standards for these software programs.

Technological obsolescence is a significant cause of information loss, and data can quickly become inaccessible to users if stored in out-of-date software programs or on outmoded media. Maintaining digital files involves managing the ever-changing associated infrastructure of hardware, software, file formats, and storage media. Major changes in hardware can be expected every 1-2 years, and in software every 1-5 years (Vogt-O'Connor 2000). As software and hardware evolve, data sets must be consistently migrated to new platforms, or they must be saved in formats that are independent of specific platforms or software (e.g., American Standard Code for Information Interchange (ASCII) delimited files).

Any data set for which data entry or updates is still occurring will be stored in subdirectories under the "I&M" directory on the NCPN server (e.g., I&M\vital_signs). The "Archive" directory and subdirectories are reserved for data sets that will no longer change.

10.1.1 Short-term data sets

For short-term data sets created or managed by NCPN, upon project finalization a set of ASCII comma-delimited text files will be created for each data table comprising the data set. These files will be accompanied by a readme.txt file that explains the contents of

each file, file relationships, and field definitions. The ASCII files are in addition to the native version of the dataset (typically in database or spreadsheet format). Creating these text files will help ensure the data are usable in a wide range of applications or platforms. NCPN has created a utility called `Access_to_ASCII.mdb`, which automates the creation of these ASCII files. All finalized files will be stored on the NCPN server's archive section in the appropriate project folder.

In addition to creating ASCII files, NCPN will also update completed and archived data sets that may be in older versions of MS-Access, with the goal of having no dataset more than two versions behind the current version used by NCPN. There is the risk of losing a certain amount of performance in the process of conversion; for example, complex data entry forms or reports may not function properly in an upgraded version. To the extent possible, proper functionality of data entry forms and reports will be maintained; however, the priority will be to ensure basic table and relationship integrity. All previous versions of the data set will be saved.

10.1.2 Long-term monitoring data sets

Long-term monitoring data sets require regular updates and conversion to current database formats. All active or long-term databases will conform to the current NPS and I&M software version standards.

Monitoring projects will also have variable long-term data archiving requirements. Raw data sets that are later manipulated or synthesized may need to be stored in perpetuity. Modifications to protocols will typically require complete data sets to be archived before modifications are implemented. And, depending on the monitoring project, it may be necessary to preserve interim data sets (data "milestones") over the long term. Archived data sets or subsets destined for long-term archiving will be saved, whenever possible, in their native formats in addition to ASCII text files. Specific data archiving requirements for ongoing projects are spelled out in the data management standard operating procedures (SOPs) for each monitoring project.

10.1.3 QC of converted data

All ASCII files created from databases will undergo quality control (QC) to ensure that the number of records and fields correspond to the source data set, and that conversion has not created errors or data loss. A second reviewer (preferably a program scientist) will evaluate the ASCII files and documentation to verify that tables, fields, and relations are fully explained and presented in a way that is useful to secondary users.

Databases that are converted from one version of MS-Access to an upgraded version will require additional QC; in particular, if the databases are being actively used for data entry or analysis. Forms, queries, reports, and data entry all will be thoroughly tested.

10.1.4 Version control

Previous versions of databases will be saved in their native format and archived in addition to the current version. Documentation of version updates and associated details will be part of the archive metadata document, and revision information and history will be included in tables within the database files themselves as well. Directory and file names should be assigned according to the following conventions:

Raw Data

Raw data sets obtained from secondary sources are archived in their native format before any manipulation is done to the data. These data should be stored in a raw_data directory, with file names consisting of the data source name and the download date.

Example:

\Archive\monitoring_archive\climate\raw_data\NWSCoop\ NWSCoop_10Feb04.ext
where .ext is the extension of the native format.

Working Backup Files

Databases containing processed data should be backed up before new data sets are appended, and regularly during data entry. These data sets should be stored in a working_backup subdirectory, with file names consisting of the database name, version, and date. Example:

*\Vital_Signs\peregrine_falcon\data\working_backup\
peregrine_falcon_2.3_10Oct04.mdb*

Version Archives

Long-term archive files are created before any database version or software upgrade occurs. These data sets are stored on the NCPN server in their native MS-Access format:

\archive\monitoring_archive\climate\version_archive

A subdirectory is created for each version number. File names of archive files will contain the database name, the database version number, and the word Archive.

Example:

Version_1-00\SnotelClimate_1-00_archive.mdb

In addition to the copy of the database in MS-Access format, all tables will be archived in a comma-delimited ASCII format by using the Access_to_ASCII.mdb utility developed by NCPN. These ASCII files will reside in the version archive subdirectory and will be named according to the database version number. Example:

Version_1-00\SnotelClimate_1-00_archive.txt

10.1.5 Spatial data

Spatial data sets that are essential to NCPN will be maintained in a format that remains fully-accessible by the current ArcGIS version. ArcGIS has maintained compatibility with previous data formats, and while shapefiles have retained functionality in ArcGIS, coverages may require conversion if they are no longer supported. At this time there is no practical way to save GIS data in a software or platform-independent format.

Both uncorrected and corrected global positioning system (GPS) data (e.g., .ssf and .cor files) will be archived in their native format in addition to the corresponding GIS files that are created.

10.2 Storage and Archiving Procedures – digital data

10.2.1 Directory structure for electronic archives

Digital data need to be stored in a repository that ensures both security and ready access to the data in perpetuity. As of 2004, NCPN relies on a 750 GB server with a level-5 RAID (redundant array of independent disks) for data storage, combined with a schedule of full, incremental, and differential backups using 8 mm tape. The server is located in a locked, climate-controlled room and is managed by the system administrator of the Southeast Utah Group (SEUG) of parks.

Figure 10-1 illustrates portions of the current directory structure for both active and archived data files, including GIS data. This directory structure was devised, in part, to accommodate two different backup schedules: one for rapidly-changing files; the other for relatively static files.

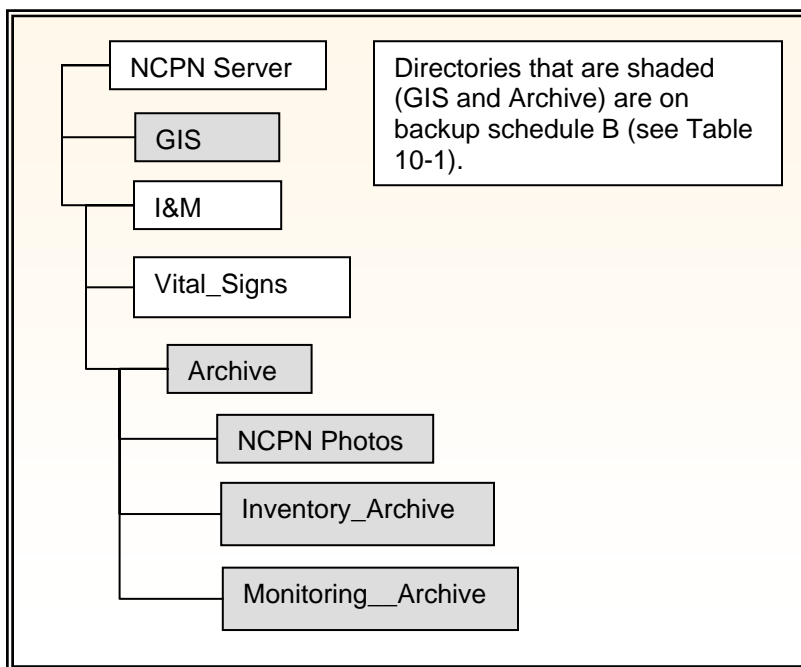


Figure 10-1. Schematic of data components of the NCPN server. All directories are not shown.

10.2.2 Directory structure for individual projects

The organization and naming of folders and files should be intuitive to users unfamiliar with a specific project. Because each project will have its own idiosyncrasies, a standardized structure isn't realistic; however, all project archives will include several to most of the following elements:

- administrative documents such as agreements, correspondence, research permits
- programmatic documents including protocols, procedures, supporting documents
- interim data sets or “milestones”
- data sets submitted by contractors

- data sets reformatted or manipulated by NCPN (e.g., data converted to Natural Resource Database Template format, data sets migrated to current software formats)
- data sets – ASCII format
- conceptual or statistical models used for data interpretation
- final report
- readme files -- includes an explanation of directory contents, project metadata (including a dataset catalog report), and version documentation.

Once final data and reports have been submitted, draft products do not need to be maintained. Appendix K (Examples of directory structure and documentation for archived data set) provides an example of readme files documenting completed projects.

10.2.3 Backup procedures for digital data

The risk of data loss can come from a variety of sources, including catastrophic events (e.g., fire, flood), user error, hardware failure, software failure or corruption, and security breaches or vandalism. Performing regular backups of data and arranging for off-site storage of backup sets are the most important safeguards against data loss.

NCPN is integrated into the NPS SEUG local area network and benefits enormously from the expertise of the SEUG system administrators.

Data residing on the NCPN server are backed up onto a series of LaCie external hard drives using Veritas backup software. Two routines are used. Backup schedule A is designed for frequently-changing files and allows for total recovery of data from the previous 6 weeks. Because these are actively-used files, most data loss or corruption can be detected within this time. Backup schedule B is designed for archival data or voluminous data files that are relatively static, and allows for total recovery of data from the previous 12 months. Off-site storage of backup tapes is at Arches National Park, located approximately 6 miles from the SEUG office. All backups are performed and monitored by the SEUG system administrators.

In addition, very large geospatial data files residing on the GIS Specialist's computer are regularly backed up to an external hard drive directly connected to the GIS Specialist's computer. This minimizes network traffic and decreases overall backup time.

Backups of data that reside on the personal computers of staff are the responsibility of each staff member. The preferred method is for staff to regularly copy important files onto a personal directory on the SEUG network, where daily backups are performed. Staff may also place data in the archive section of the I&M server with the approval of the data manager.

Because the amount of NCPN data is increasing rapidly, this backup schedule and system will need to be reevaluated at least annually. Backup routines represent a significant investment in hardware, media, and staff time; however, they are just a small percentage of the overall investment that has been made in program data.

Table 10-1. Backup schedule for NCPN I&M server

Schedule A – frequently-changing files; estimate total of 75-100 GB by 2006. Used for all files located on NCPN Server\I&M	
6 250-GB Drives	Full backup each Wednesday night, three incremental backups over the remainder of the week. Sets are rotated off-site the following Wednesday; next set in sequence is retrieved to be overwritten.
Schedule B – large files, relatively static; estimate total of 400GB by 2006. Used for all files located on NCPN Server\GIS and NCPN Server\Archive	
1 500-GB Drive	Biannual full backup; weekly differential backup rotating through 6 Schedule A drives.

Testing of backup files

10.2.4 Data and network security

Because NCPN is located within NPS offices, local and wide area networks currently conform to Department of Interior security guidelines.

Only I&M staff and system administrators have permission to access files on the I&M server, and restrictions have been established on archived data files. Directories containing completed project data or interim versions of ongoing projects are designated as read-only for all staff with the exception of the data manager. In this way, any changes must be routed through the data manager, who is responsible for ensuring that documentation and readme files associated with the data set are updated.

10.3 Storage and Archiving Procedures – documents and objects

This section applies to documents such as final reports prepared by staff or contractors, program administrative documents, contracts and agreements, memoranda of agreement, and other documents related to NCPN administration, activities and projects. This section also applies to physical items such as natural history specimens, photographs, or audio tapes. In most instances these documents and objects are essential companions to the digital data archives described above.

Direction for managing these materials (as well as digital materials) is provided in NPS Director's Order 19: Records Management and its appendix, NPS Records Disposition Schedule (National Park Service 2003). NPS-19 states that all records of natural and cultural resources and their management are considered mission-critical records; that is, they are necessary to fulfill the NPS mission. NPS-19 further states:

Mission-critical records are permanent records that will eventually become archival records. They should receive the highest priority in records management activities and resources and should receive archival care as soon as practical in the life of the record.

Section N of Appendix B, which provides guidelines on natural resource-related records (including the results of Inventory and Monitoring Programs), indicates that all natural resource records are considered “permanent,” that is, are to be transferred to the National Archives when 30 years old. It also indicates that non-archival copies of natural resource-related materials are “...potentially important for the ongoing management of NPS resources” and should not, in any instance, be destroyed.

10.3.1 Documents

All paper documents managed or produced by the NCPN will be housed in one of four locations:

1. *NCPN central files, Moab, Utah.*

These files contain project files, administrative documents and non-record copies of documents that are archived at an off-site facility (see item 2, below). Examples include: meeting minutes, correspondence, memoranda of understanding, contracts and agreements, research permits, interim and selected final reports produced by the program or under its auspices. NCPN will use acid-free paper and folders for all permanent records in the central files. In addition to maintaining these paper records, NCPN will maintain electronic versions, when possible, on the NCPN server. The central files are maintained by the NCPN administrative clerk, under the guidance of the data manager and program coordinator.

2. *Park-based Museums, libraries, central files*

High-quality copies of park-related documents resulting from NCPN projects, along with electronic versions, will be provided to park resource management staff. Parks may choose to accession these materials into their museums, incorporate them into their central files, or house them in their resource management library, as they deem appropriate. NCPN will not manage documents at the park level.

2. *Western Archeological and Conservation Center (WACC)*

[Repository subject to change.] WACC, located in Tucson, Arizona, provides temperature and humidity-controlled facilities, a professional curation staff, and meets all museum standards set by NPS. This repository will be used for original documents and associated materials produced by the network (e.g., photographs, field notes, permits) that are a high priority to maintain under archival conditions. Examples include: original inventory reports and accompanying slides and maps; and NCPN monitoring plan reports. Copies of these reports will be maintained in the NCPN central files, and all will have an electronic equivalent (e.g., pdf) for distribution or reproduction.

For all materials submitted to WACC, NCPN will provide essential cataloging information such as the scope of content, project purpose, and range of years, which will be used for Automated National Cataloging System (ANCS+) record creation. NCPN will also ensure that materials are presented using archival-quality materials (acid-free paper and folders, polypropylene or polyethylene slide pages). Upon the recommendation of museum staff, NCPN uses Light Impressions (www.lightimpressionsdirect.com) as the source for most of its archival storage materials.

Many NCPN reports and documents encompass data from multiple parks, which has made it difficult to accession archival copies into a specific network park museum. In these instances WACC will prepare associated ANCS+ records that reference all parks included in a report or document, and will prepare finding aids to help potential users locate the materials.

10.3.2 Specimens

Specimens collected under the auspices of NCPN will be provided to the network park in which they were collected, or to a repository approved by a park (where the specimens are considered on loan). NCPN will provide park curators with associated data required for cataloging each specimen. These data will be in comma-delimited (.csv) format for automated uploading into ANCS+. Data provided to non-NPS curators will be in Excel format.

10.3.3 Photographs

Archivists have been reluctant to fully embrace digital photography because of a concern that, with the accelerating rate of technological change, documentary heritage is in danger of being lost in the information age (Cox 2000).

NCPN has chosen to take a conservative approach and requires staff and contractors to provide photos as 35mm slides (preferably Kodachrome or Ektachrome) which have a proven long-term stability (Wilhelm and Brower 1993). If slides are not possible, 4x6 color prints are requested. Original images are a high priority for placing in archival storage conditions.

Slides are labeled using indelible pigment ink, or using laser-printed archival-quality slide labels. Slide labels will include: a unique ID, project name, photographer, photo date, a brief identification of contents (e.g., species name, plot ID), and geographic location (UTM coordinates or description). All slides are stored in polypropylene slide sleeves at the NCPN office until transferred to WACC. In addition, all slides are scanned and saved as Tagged Image Format Files (TIFF) or Joint Photographic Experts Group (JPEG) format.. These electronic files are the primary means of distributing or reproducing the images.

When photographs are provided, they are stored in individual polypropylene sleeves within archival boxes. Each photo is labeled on the back, using archival-quality labels that are either laser-printed or hand-labeled, with the same information elements required for slides. If a contractor is submitting photographs, corresponding TIFF files must also be submitted.

Every image, regardless of format, has an entry into the NCPN Photo Database (see Appendix E, NCPN photo management guidelines), where attributes such as electronic file name, keywords, project, photo description, photographer, date, and location are catalogued. All photo files and the associated photo database are housed on the archive portion of the NCPN server (Figure 10-1).

10.3.4 Role of curators in storage and archiving procedures

Curators for parks within NCPN are an ongoing source of expertise, advice, and guidance on archiving and curatorial issues, and they have a role in almost all projects undertaken by the network. Project leaders should involve park curators when projects are in the planning stage, to ensure that all aspects of specimen curation or document archiving are considered, and that any associated expenses are included in project budgets.

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Appendix A. Data Management Plan revision history log

Modifications to the Data Management Plan are recorded in this table. Minor changes or updates made to sections will be noted as they are changed. Significant changes in data management procedures will warrant a new version number, to be determined by the Data Manager. Numbering procedures are detailed in Chapter 1.3.

Version 1.0

Previous Section #	New Section #	Revision Date	Author	Summary of Changes

Previous Section #	New Section #	Revision Date	Author	Summary of Changes

Appendix B. NCPN user guidelines for NatureBib



NATUREBIB GUIDELINES AND FREQUENTLY ASKED QUESTIONS

BACKGROUND

The Natural Resource Bibliography, NatureBib, developed by the National Park Service (NPS), is an internet-based application used to catalog, search, and manage natural resource-related information sources pertaining to national parks. NatureBib comprises records that were entered in the previous NRBib system, as well as other NPS systems such as GEOBib, DEERBib, etc.

The Inventory and Monitoring Program for the Northern Colorado Plateau Network (NCPN) is using NatureBib to catalog and manage published and unpublished reports, journal articles, conference proceedings, theses/dissertations, and other similar documents that are related to park natural resources. Our goal is to see NatureBib developed into a reliable, long-term tool that park staff can use on a regular basis.

NatureBib is intended for the more traditional *paper* or *hard copy* sources of natural resource documentation in parks. It works in conjunction with the other data systems used by NCPN:

- *Metadata*, for documenting geospatial data;
- *Dataset Catalog*, for documenting databases, spreadsheets, tables, or other types of processed or unprocessed data that exist in electronic or tabular formats; and
- *NPSpecies*, for storing, managing and disseminating information on plant and animal species occurring in NPS units.

ACCESSING NATUREBIB

NatureBib Web Version

Primary access to NatureBib for entering, viewing and editing records is via the NPS website, <https://science1.nature.nps.gov/naturebib/>. NatureBib requires a login name and password. To obtain a login request form, go to the NPS website, <http://www.nature.nps.gov/nrbib/index.htm> or contact NCPN data manager.

NatureBib MS Access Version 2

An MS Access desktop version of NatureBib (currently Version 2.1) also exists for use without an internet connection. However, only newly-created citations (not existing edited records) can be

uploaded to the main database. Nevertheless, due to its greater speed in navigation through records, the desktop version may be useful for locating record errors. The desktop version is also useful for creating complex reports or special formatting tasks. To obtain an MS Access version, go to website, <http://www.nature.nps.gov/nrbib/index.htm>, and contact Wendy Schumacher at wendy_schumacher@nps.gov for park-specific back-end files.

Note: Currently, NCPN NatureBib users are generally Inventory and Monitoring Program and Park staff members. While park staff members are encouraged to obtain a password and begin using NatureBib, most park staff will not be able to create or change records unless they have been trained by NCPN data management staff.

NATUREBIB GUIDELINES

Data Mining

Data mining (finding and defining information resources) at parks is necessary prior to documentation in NatureBib. This involves visiting parks to find and define information resources.

Data mining begins with review of cataloguing work that has already been done. Most parks had fairly thorough bibliographies completed (using ProCite software) in the mid-1990s, and these records have been converted to NatureBib. Sources that have already been catalogued will usually have labels on them with a reference number such as NABR-1245. This is referred to as the NRBib number and corresponds to the earlier cataloguing system. From this review you should be able to determine which sources have not yet been processed. Documents cited in NatureBib should also have the BibKey ID number on them. Remember, however, that duplicate copies of an entered document may or may not be labeled.

Types of Records in NatureBib

The focus of NatureBib is park-related, natural resource information. For example, it is not intended to be a definitive bibliographic source for all literature available on the Mexican spotted owl, but it should be used to catalog reports related to research on spotted owls conducted within a park, or to catalog journal articles that reference the park. In addition, sources that pertain to adjacent, ecologically similar areas (e.g., BLM lands) should also be considered for addition to NatureBib if they have relevance to park management issues. Miscellaneous items such as maps and correspondence can also have a place in NatureBib, based upon their content. Natural resource-related information encompasses topics such as soils, climate, air and water, vegetation, flora, and fauna. A web-based tutorial is available at <http://www.nature.nps.gov/nrbib/tutorial/HOME.html> to help you identify key bibliographic elements of common media types: books, journals, maps, formal reports, etc.

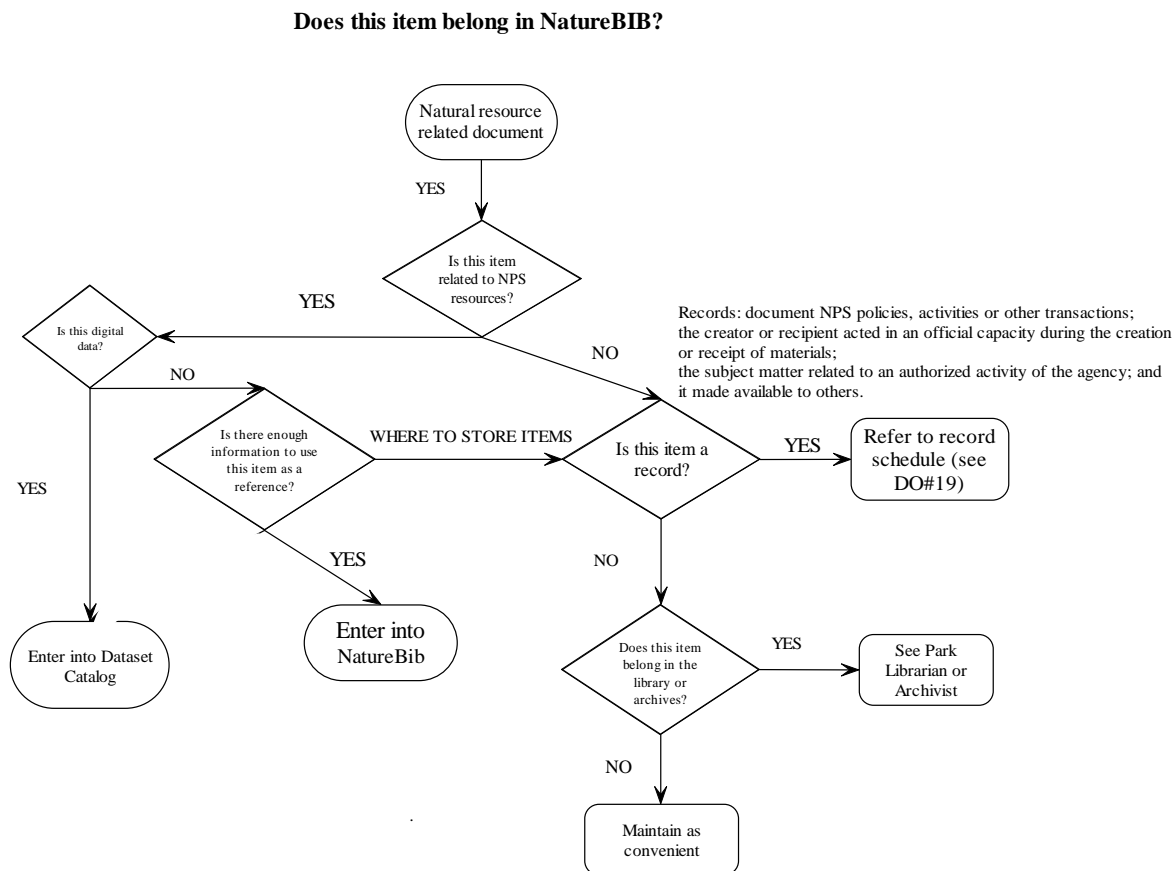
Generally, the following should be evaluated for appropriateness for NatureBib:

- Published reports
- Unpublished reports
- Books

- Book Chapters
- Journal articles specific to park resources
- Conference Proceedings
- Current and historic research permits (these indicate who has been conducting scientific research at the parks and may lead to reports)
- Management plans
- Maps
- Aerial photographs and photographs of natural resources
- Videos
- Correspondence (not generally documented unless the letter is used to report important natural resource information)

Deciding which documents to enter will be a judgment call. Do not use NatureBib to enter citations on very general works that address broad topics with no specific application to a park (e.g., “Weeds of the West”). Also, avoid using NatureBib as a general directory to natural resource files. Sometimes it may be appropriate to reference a file folder of materials, however, this should not be done as a matter of course.

Consider this flowchart for determining if an item belongs in NatureBib:



By the end of 2004, tools will be available to allow full-text (pdf format - electronic versions) NatureBib documents to be available on-line. When locating new sources for NatureBib, obtain electronic (preferred) or paper copies of documents to be put into pdf format. Priorities include:

- Documents supporting and linked to certified NPSpecies lists
- Final reports, not preliminary or interim, unless no final report is provided or expected
- Documents specifically requested by Parks
- Documents produced or sponsored by NCPN.

Until the WASO terabyte server (repository for full-text documents) is up and running, full-text files (in pdf format) will be stored on the I&M NCPN server in X:\Archive\NatureBib Library. Files will be named: lastname of firstauthor_year_bibkeyID.extension (e.g., Giroir_2003_551998.pdf). All full-text documents should have an associated NatureBib record. The file name for the full-text version will be saved in the corresponding NatureBib record in the **URL of Online Document** field.

NATUREBIB FIELDS – CLARIFICATION AND GUIDELINES

NatureBib Help Files

Help files providing guidance on field entry for the web and desktop versions of NatureBib are located on-line at <http://www.nature.nps.gov/nrbib/helpfile.htm>. Information in the on-line and desktop **Help Files** is not repeated in the table below. Instead, additions or modifications specific to NCPN will be addressed. These guidelines will provide additional guidance, clarity, or standardization during the data entry process. The standards presented here have precedence over standards that appear in the on-line or desktop Help Files.

Getting Started

Get set up with a computer with Web access, and determine the documents you are going to enter. Go to <https://science1.nature.nps.gov/naturebib/> and enter your user name and password. This will bring you to the main entry window for NatureBib. Four choices will be presented at the top of the page:

- **Simple Search/Edit** – for quick and simple searches; wildcards are not allowed with this method.
- **Advance Search/Edit** – for more advanced searches; wildcards (* for multiple characters, or ? for single characters) may be used in any field; search will return all possible completions of word(s) as well (e.g., keyword entry *mammal**, returns mammal and mammals; and title entry *Birds of* , returns Birds of Zion National Park and Birds of Arches National Park)
- **Add New Citation** – click to add a new citation record to NatureBib
- **Change Password** – passwords expire after 90 days; be sure to store your password in a safe location.

Entering New NatureBib Records

In order to avoid creating duplicate records, the first step is to see if a record of the document already exists in NatureBib.

Searching Records

- by Title

A long title presents the problem that there may have been variation in how it was entered, so you will likely have the best luck entering just a phrase from the title. The program will look for the *exact string* of letters/words you enter, regardless of its position in the title. Try to make your search string unique to the source for best results.

Example: You want to see if the document, “Plant community distribution and dynamics in Bryce Canyon National Park” has been entered into NatureBib.

- If your title search contains “Plant community” you will likely get hundreds of matches.
- If your title search contains “dynamics in Bryce” chances are the resulting matches will be very few, making it fairly easy to determine if the source has already been entered.

- by Author

If you enter an author’s name in a search, you will be presented with a list of all the sources in which that author’s name appears, even if it is as a third or fourth author and even if the last name you enter is a string of letters contained within other last names. You may also enter the last name followed by a comma and any number of letters of the first name. Note that only the first initial of the first name may have been entered into the citation.

Example 1: Entering “Graham” will result in a list of all records (for the park or parks you selected) with any Graham or Ingraham listed as an author.

Example 2: Entering “Giroir, G” will result in a list of all records with author’s last name “Giroir” and first initial of “G” or first name beginning with “G”.

After making appropriate searches, you will be presented with the results of your search in the right window frame. Review the list and see if any of the items match your document. You may need to click on the document title to retrieve the full record in order to determine this. If the citation does not exist, click on **Add New Citation** in the upper window frame. (If it’s not a new record now is a great time to verify the data in the existing record. Follow the editing procedures described below). Use the on-line or desktop Help Files and the following guidelines to create a new record.

Field Name	Description/Instructions
Document Type	In creating a new record, you must first select a Document Type . A brief description of document types follows. Most informal in-house reports are better entered as formal reports, because the formal report has fields for

Field Name	Description/Instructions
	<p>publisher/agency affiliation of the author. Do not feel compelled to enter information in every field. Sometimes fields simply won't have relevance to the particular source you are cataloguing.</p> <ul style="list-style-type: none"> • Book – published books • Chapter or Section – Chapter of published book, or section of published or unpublished report • Report (formal or published) – Any report that is formal or informal. This document type is preferred for all types of reports because it includes fields for Publisher and Publisher Location. • Report (informal or unpublished) – It is preferable to use the “formal or published” form, unless the author’s affiliation is unknown. • Journal article – Specific article in (or reprinted from) published journal.
Document Type (continued)	<ul style="list-style-type: none"> • Map - Printed or published map (not GIS data). • Conference proceedings - Collections of papers from meetings. • Thesis/dissertation - PhD dissertation, MS thesis. • Letter/correspondence - Correspondence containing significant data, decisions or conclusions. <p>Other – Other sources (e.g., slides, file folder, video, press release)</p>
Author	<p>At least one author must be submitted for the record to be accepted. Enter Author Unknown in the author's last name field, if necessary. Spell out the first name when possible. When NPS is considered the author of a work, enter “National Park Service”.</p>
Keywords	<p>Carefully go through the document to be cited and figure out the key subjects and points it contains before assigning keywords. The process of entering keywords is critical to being able to search for and retrieve documents later.</p> <p>To ensure that we have a set of keywords on which searches can be reliably based, use the list of I&M Standardized Keywords (Appendix A) for every record entered. These same keyword standards are used to add keywords in Dataset Catalog. Given that record searches rely on keywords, the use of established keywords promotes consistency, ensuring successful, comprehensive results. We have reviewed and applied the Standardized Keywords to all NatureBib citations entered before November, 2001.</p> <p>There are two imperative steps in selecting standardized keywords. Referring to the I&M Standardized Keywords (Appendix A):</p> <ul style="list-style-type: none"> • First, enter at least one Topic Area (broad term), and • Next, enter any other Standardized Keywords (more general terms) from the list. <p><i>Example: For the report titled, “Bird banding in Zion National Park”, enter topic area, <u>Animal Studies</u>, and standardized keywords, <u>birds</u> and <u>inventory</u>. Then add any additional appropriate keywords such as <u>mist-netting</u>, <u>banding</u>, etc.</i></p> <p>Use the terms, <i>Inventory</i> and <i>Monitoring</i>, broadly. For example, use these terms if the source contains or describes results of inventory or monitoring projects, or addresses</p>

Field Name	Description/Instructions
	<p>concepts, techniques or protocols related to inventory or monitoring.</p> <p>For plants and animals, always check the associated species group for threatened and endangered species-related sources. For example, a report on Peregrine Falcons would have the term, <i>birds</i>, entered, as well as, the term, <i>threatened-endangered-sensitive</i>.</p> <p>Include the Latin names of species that are addressed in the source; however, if the number of species covered is extensive, try to find an appropriate general term (e.g., raptor, small mammal, or amphibian).</p>
Link/Edit/Unlink Parks and Park-Specific Data	This field is for identifying parks which have a direct link to the document cited. This may include parks outside the NCPN network.
Add/Edit/Delete Holdings Data	See Location in the NatureBib Help Files.
Title	<p>Enter the title of the document exactly as it appears on the source. (If there is a misspelling, make a note of it in the General Notes field so database users will not mistake it for a typo.) Capitalize the first word and any proper nouns in the title.</p> <p><i>Example:</i> "Factors influencing development of cryptogamic soil crusts in Utah deserts."</p>
Publisher	<p>This field can be interpreted fairly loosely. If there is a formal publisher of the work, enter the name (e.g., Island Press). If there is no formal publisher, enter the organization or agency that has sponsored the publication or to which the author is affiliated.</p> <p><i>Example:</i> You are creating a record for a biennial report prepared by an NPS staff member at Zion National Park. Enter the person's name in the Author field, and USDI National Park Service, Zion National Park in the Publisher field. Place of Publication is the town and state in which the park is located. In this case, Springdale, UT.</p> <p>One advantage to including this information is it gives the reader of the citation a point of contact for locating a copy of the report.</p>
Place of Publication	Enter the city or the place where a work was created. Abbreviate the state with the standard two-letter abbreviation (e.g., UT, CO, NM).
Length & Packaging Method	If the source has unnumbered appendices, enter the information into the packaging method field. For example, for a work that is "120 pp. plus appendices" enter "120" in the Length field, and "pages+appendices" in the Packaging Method field. Do not enter "120 pp." in the length field as this will create errors in a report output.
URL of online document	Enter the URL address for viewing the full-text pdf version of the document. NCPN protocol for naming these pdf files is as follows: enter the author's last name, underscore, year of publication, underscore, and BibKey ID# followed by pdf.

Field Name	Description/Instructions
	<p><i>Example:</i> Giroir_2003_551998.pdf</p> <p>Additional instructions for preceding the file name with on-line location, (e.g., http://[foldername]) will be determined in the near future.</p> <p>See additional information on this matter at the end of this document in NatureBib – Future Developments.</p>
Topic Area	The Topic Area list was established by matching it to the subject area on the permit application of the Investigator Annual Reports (IAR). You can choose only one Topic Area . Only choose a Topic Area when documenting an IAR record. All IAR records should be entered into NatureBib, matching the Topic Area field with the <i>subject area</i> on the permit application.
Database System	The majority of records entered will be related to natural resources. Select <i>NRBIB</i> for these records. Other subject specialties encountered may be <i>GRBIB</i> for geologic resources and <i>PALEOBIB</i> for paleontological resources.
General Notes Regarding this Citation	<p>Use this field for any general information about the source that is not contained in other fields. If in doubt of which field to enter information, enter it here. Entering information into the wrong field may result in report format errors.</p> <p><i>Example: The Series Title is printed after the Title in a report. Therefore, if information intended for the General Notes field is entered into the Series Title field, it will be erroneously printed after the title in the report.</i></p>
Citation Abstract	This is where you summarize the contents of the source. By reading your abstract, subsequent users should be able to determine if the source will be useful or applicable to their needs. Do not copy, verbatim, abstracts already provided in journal articles as these may be copyrighted. If it is necessary to copy an abstract from a source, type at the end of the abstract “(from journal Abstract)” or “(from General Summary)”.
Sensitivity	Choose “Public” if there are no concerns or regulations regarding release of this document to the public. Choose “NPS Only” if the source contains location information on threatened or endangered species or other information deemed sensitive by a park.

Finalizing Records

Once you have completed the record, click **Submit Edits** at the bottom of the right window frame. The record will then appear in the right screen. Carefully review the information you’ve entered and check for misspellings, transpositions, and omissions. Do not overlook this step. If you find errors, go to the upper right of the output record and click on **Edit Citation Data**. You’ll then be put back in the record where you can make corrections. Edits to the fields in the left window frame must be individually submitted. The remainder of the document record, including title, abstract, etc., can be edited in the right frame. Once you’re satisfied, click **Submit Edits** at the bottom of the form and review the output once again. When you have an error-free record, print it, and write the BibKey ID number in pencil on the front cover or first page (if hard-cover book) of the document. It may be necessary to use labels to document the BibKey ID (e.g., videos, or to avoid writing on

special documents), however, it is not the preferred method due to the eventual degradation of label glue. If possible, also attach a record printout to the source document.

Existing NatureBib Records – Cleanup, Editing, Deleting

- **Cleaning up Records**

The conversion of records from the NRBib/ProCite system to the web-based system has resulted in many records containing errors, mostly through data being placed in inappropriate fields. In addition, some of the cataloguing work done previously was not as thorough or careful as it could have been and many important data terms are missing. In tandem with creating new records, go through your park's citations and check them for accuracy and consistency.

Problems to look for:

- ◆ All words (instead of first word and proper nouns only) are capitalized in the title.
- ◆ Document type is incorrectly chosen. Many converted NRBib records will need a change of document type from **Chapter or Section (of a book or report)** to **Report** (usually published).
- ◆ Keyword list is incomplete. Check keywords, which you may be able to augment by reading the abstract or reviewing the original source materials. (Read about **Keyword** field entry first. See table above and Appendix A.)
- ◆ Records have missing dates, author, publisher, abstract, keywords, etc. Try to locate the original documents and complete the NatureBib records as best you can.
- ◆ If a preliminary report has been submitted, it should eventually be *replaced* in NatureBib by the final report citation.

- **Editing Records**

To review your park's records, search for a record or record(s) in question. You'll then see a list of abbreviated citations in the right window frame. Click on a citation that appears to be incomplete or suspicious-looking and you will be presented with the complete record. At the top right of the record, click on **Edit Citation Data**. After making edits to the record, you may change your mind and click on **Clear Edits** at the bottom of the right window frame. This will only clear changes you have just made.

It may be easier to use the desktop version of NatureBib to determine errors and then go back to the on-line version to make corrections (only *new* NatureBib records can be uploaded from the desktop version).

The record creation date is identified by the **Date Created** field. The **Last Edited** field is automatically populated based on the date, time and user ID of the last editor (e.g., **Last Edited:** 09/03/2002 09:12 AM by **NPSPN_NW18E7**).

- **Deleting Records**

Occasionally, you may find duplicate entries for the same NatureBib record and will need to delete one of them. When two numbers follow each other consecutively is often a *general* clue that a record could be a duplicate. Call up each of the records to review. Verify that they are the same document – look at page numbers, title, and date – they should be the same. Delete the record that has the least amount of information. For example, one may not have an abstract

or a place of publication, while the other one does. However, before you delete a duplicate record, make sure that the remaining record has the most complete set of information, which will usually be a product of both of the records. If both records have an abstract with somewhat different information, be sure that the abstract that remains combines the information from the record to be deleted with the record that remains. To avoid future confusion, it's a good idea to indicate in the **General Notes** field that a duplicate record (indicate **BibKey ID**) was deleted.

Follow these steps in deleting records:

- On the left window of the screen, select the **Link/Unlink** button, and deselect all of the parks associated with that record. Do the same for the **Holdings Data**, while making sure that the record that remains has the same links and holding information. After you have done this, and verified that the remaining record contains as much information from the two records combined, delete the record you've chosen by selecting the **Deleted** radio button located on the right window of the screen under **Citation Status**.
- If applicable, enter the **Final BibKey ID** in the upper part of the right window of the screen. This is the **BibKey ID** of the record to be kept.
- At the bottom of the screen, hit the **Submit Edits** button and the record will be deleted.

The screenshot displays a web-based data management interface. On the left, there are two sections: 'Link/Edit/Unlink Parks and Park-Specific Data' and 'Add/Edit/Delete Holdings Data'. Both sections contain a list of links, with 'Zion (ZION)' highlighted. A 'Link/Unlink' button is visible in the first section, and a 'New' button is in the second. On the right, the 'Report (Informal or Unpublished) Citation' section contains a form. It includes a 'Final BibKey ID' field, a 'Citation Status' section with 'New' and 'Deleted' radio buttons (where 'Deleted' is selected), and various text input fields for 'Title', 'Publication Date', 'Length', 'Packaging Method', 'URL of Online Document', and 'Topic Area'. A list of topic areas is shown at the bottom right.

Important Note: The **BibKey ID** number you've chosen to delete may be written on the hardcopy of the report, as you have been instructed to do. Try to locate the original document and verify that the **BibKey ID** number you have selected to keep is also the number on the front of the document.

NATUREBIB – FREQUENTLY ASKED QUESTIONS

How do I document Investigator's Annual Reports (IARs)?

- Leave IARs of substance in NatureBib if no Annual Report exists. Reformat the title, as necessary: "Investigator's Annual Report: [title of IAR]".
- Enter IARs of substance if no Annual Report exists. Create one Bibkey ID for all IARs by project. Document the IAR numbers and their related parks (there may be multiple parks involved) in the General Notes section.
- Create a NatureBib record for each individual Annual Report. Reference the IAR number in the General Notes section.
- Delete a NatureBib record that documents an IAR when a related Annual Report NatureBib record is created. Document the related IAR number(s) and the deleted Bibkey ID number in the General Notes field of the Annual Report NatureBib record.
- When time permits, consolidate previously-entered NatureBib records of IARs by project (if no Annual Reports exist).
- Select "IAR" as the Project Database (feature available in the future).

What if a source contains information on more than one park?

You will likely come across sources that contain information on multiple parks (both within and outside of the Northern Colorado Plateau area). If several parks are associated with a source, go ahead and link the source to all of its parks, and provide holding information for those copies of which you are aware. For parks over which you have no editing power, note the **BibKey ID** number of the source and send it, along with the names of the additional parks, to margaret_beer@nps.gov. Currently, you will have access restrictions (linked to your username/password) that prevent you from editing the data from other parks.

What if a source has been entered by another park, but I want to link it to my park, too?

There's no reason to enter a source twice. Go ahead and retrieve the record, and add a **Link** for your park. Then add a **Holdings Entry** for your park, and enter the holdings information.

How do you ensure that you do not have to redetermine whether or not a source has been entered into NatureBib?

A perennial cataloguing problem is making sure, 5 or 10 years down the road, that someone new can quickly determine whether a record has been catalogued and if so, what the reference number is. Once you've entered your record, write in pencil the BibKey ID number or place an adhesive label (less preferred) on the source document (e.g., BibKey ID 654978). In addition, attach the NatureBib printout page to the file folder or insert it into the report or document. Make sure the document gets filed in the place you've indicated in the NatureBib record. Encourage parks to centralize NatureBib documents locations where possible.

As a final review before filing the document and moving on to the next one, ask yourself these questions:

1. Will database users who want or need this record be able to retrieve it?
The most common way of retrieving records will be by matching words, usually in the title, author, or keywords fields. It is very important to avoid misspellings and abbreviations. A few abbreviations used in this database are US, USDI, I&M, and states (e.g., UT, CO, NM). Since

acronyms can be ambiguous they should be avoided or provided in parentheses following the full spelling of the first use in a record.

2. Once users find this record will they be able to decide if the document is useful?
Your abstract and associated information should give users enough information to determine if the document contains the information they are looking for. Consider who, what, when, where and why in the abstract.
3. Once users decide the document is what they need, will they be able to find a copy?
Their success depends on how complete the document filing location information is. Be specific and practical in your details. When updating NatureBib records for a park, determine if documents have been relocated, and edit the holdings locations when necessary.

Creating a useful bibliography record that accurately documents a source is not a quick process and there are no shortcuts. The work you do will be used and viewed by many others in the years to come and may be the only way for someone to locate a key document. Spelling errors, typos, incomplete sentences and incomplete records will compromise the quality and credibility of the database. Take your time, be thorough, and double-check your work.

ASSOCIATING NATUREBIB RECORDS TO NPSPSPECIES

NPSpecies is a companion database to NatureBib and is also accessible via the web. The purpose of NPSpecies is to build and manage park-wide species lists that are substantiated by references, vouchers, and, later, by observations. The process of reviewing and entering park references is an excellent opportunity to build species data at the same time.

NPSpecies has four main components:

- *Park Species List*: this is a ‘master list’ for the park—species known or suspected to occur in the park.
- *References*: this links park species and the references that document their occurrence in the park.
- *Vouchers*: this links park species and the voucher specimens that document their occurrence in the park.
- *Observations*: this links the park species with any observation or location records.

In the course of NatureBib work, you will work with the References section of NPSpecies.

NPSpecies has an excellent Help section (<https://science1.nature.nps.gov/npspecies/> - lower left window frame). Please take the time to read through this section carefully. The on-line documentation will give you essential background.

How do I know if I should update NPSpecies when I’m entering a NatureBib record?

The process of entering a NatureBib record requires carefully evaluating the contents of the source document. During your review you will see if species are specifically mentioned, observed,

collected, photographed, or otherwise noted by the author(s). Judgment will certainly be required to assess if a source is a reliable substantiation for species presence in a park. For example, a summary report prepared by a local, well-known expert on cacti would probably be deemed reliable; a species list prepared by a visitor whose credentials are not known would probably not be reliable. Journal articles and other peer-reviewed publications are good sources of species data. If you are in doubt, consult with others in your office.

Because most of you have just a limited number of hours to devote to this project overall, reserve this step for sources that are both highly-focused on a species or small group of species, and highly-credible (e.g. a journal article describing locations of an endemic plant species in a park).

I've just entered a source related to summer bird surveys. Twelve species are detailed and well-documented in the report by a university-affiliated researcher. Now what do I do?

The first thing to do is write down the BibKey ID number directly on the source, or make a note of it. Then go back to <https://science1.nature.nps.gov/npspecies/> to enter NPSpecies. (Minimize NatureBib and you can go back and forth between the two.)

From the main NPSpecies window, go to the left-hand frame and click on "Edit." Then highlight the park and press "Submit."

You'll now see four columns corresponding to the four major categories of NPSpecies. Since you want to link your reference to the species it documents, click on "Birds" under the "References" column.

From the left window frame, you now want to "Search for and link to a reference not listed below." You can now enter criteria to retrieve the document you want to link. Select BibKey ID as the field to search, and enter the ID number in the designated box. Your reference will be retrieved.

Next, "Add Park Species to this Reference." A list of all park species will be displayed. Use your control key to highlight all species substantiated by the reference and click "Submit Edits."

Linking of references to species records using the NPSpecies web interface will be done only on certified data. There is always the chance that the local (Access) version of NPSpecies is the most current version for uncertified data, in which case any web edits could be overwritten.

All references will be linked to species names as the names appear in the source document. If a park species record does not exist for a particular species name in a reference, send the BibKey ID, park, and species name(s) to the NPSpecies specialist (currently E. Nance). She will create the park species record, ensure that it is correctly mapped to the local list name, and will link the reference.

NATUREBIB - FUTURE DEVELOPMENTS

- NatureBib may eventually be linked to references on cultural resources and other park operations.
- The public version of NatureBib is in development. Although the NatureBib interface may not be available soon, references that are available for public viewing may be seen through NPS Focus as soon as March, 2004.
- The NR-GIS Datastore (<http://science.nature.nps.gov/nrdata/>) is available on-line. This site will be used to access full-text pdf version of documents cited in NatureBib. The **URL of Online Document** field will contain the on-line location of the pdf file. Data Managers will be managing the folders, not WASO.

A note about this document

The goal of this document is to provide a brief introduction to NatureBib, to enable someone to begin entering data, and to provide data standards for records within the Northern Colorado Plateau I&M Network. In the course of using these databases, please use and read on-line help and FAQs which will contain more comprehensive background information (<http://www.nature.nps.gov/nrbib/index.htm>). Keep in mind that the standards and procedures outlined here will change over time as NatureBib/NPSpecies software and methodology evolve.

Please add to, edit, and correct this document as needed, and send your changes to missy_powell@nps.gov so that other park staff can benefit from your ideas and work. Ideally this guide will improve with use, and develop into a reference that provides continuity through software upgrades and staff changes.

Last updated 8/26/2005

Attachment A. Standardized keywords used in Dataset Catalog and NatureBib

Topic Area	Keywords
Animal Studies	invertebrates
	fish
	reptiles/amphibians
	birds
	mammals
	threatened-endangered-sensitive animals
	exotic/invasive species – animals
Plant Studies	non-vascular plants
	plant communities
	threatened-endangered-sensitive plants
	exotic/invasive species – plants
Physical Sciences	cave (flora/fauna)
	cave (karst)
	erosion-sedimentation
	geology
	geomorphology
	geophysics
	glaciology
	petrology/mineralogy
	sedimentology/stratigraphy
	soil science
	tectonics
	volcanology/geothermal
Aquatic Studies	coastal-marine systems
	flood management/history
	hydrology (general)
	hydrology (surface)
	limnology
	oceanography
	water quality
	water quantity
	water rights
	wetland/riparian

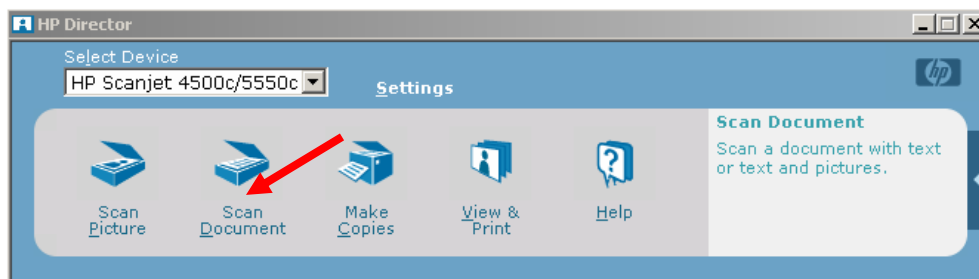
Topic Area	Keywords
Atmospheric Sciences	air quality
	climatology
	night sky/light pollution
Management	management/administration
	visitor impacts
	recreation/aesthetics
	range management
	forestry
	fisheries management
	wildlife management
	watershed management
	integrated pest management
	minerals management
	restoration – natural
	restoration - cultural
Paleontology	
[Other]	database/information systems
	GIS
	agriculture
	fire
	microbiology
	soundscape
	inventory
	monitoring
	archaeology
	ethnology
	history
	sociology
	contaminants/hazardous materials

Attachment B. Scanner instructions for hp scanjet 5550C scanner**Scanning documents with hp scanjet 5550C scanner with automatic feeder**

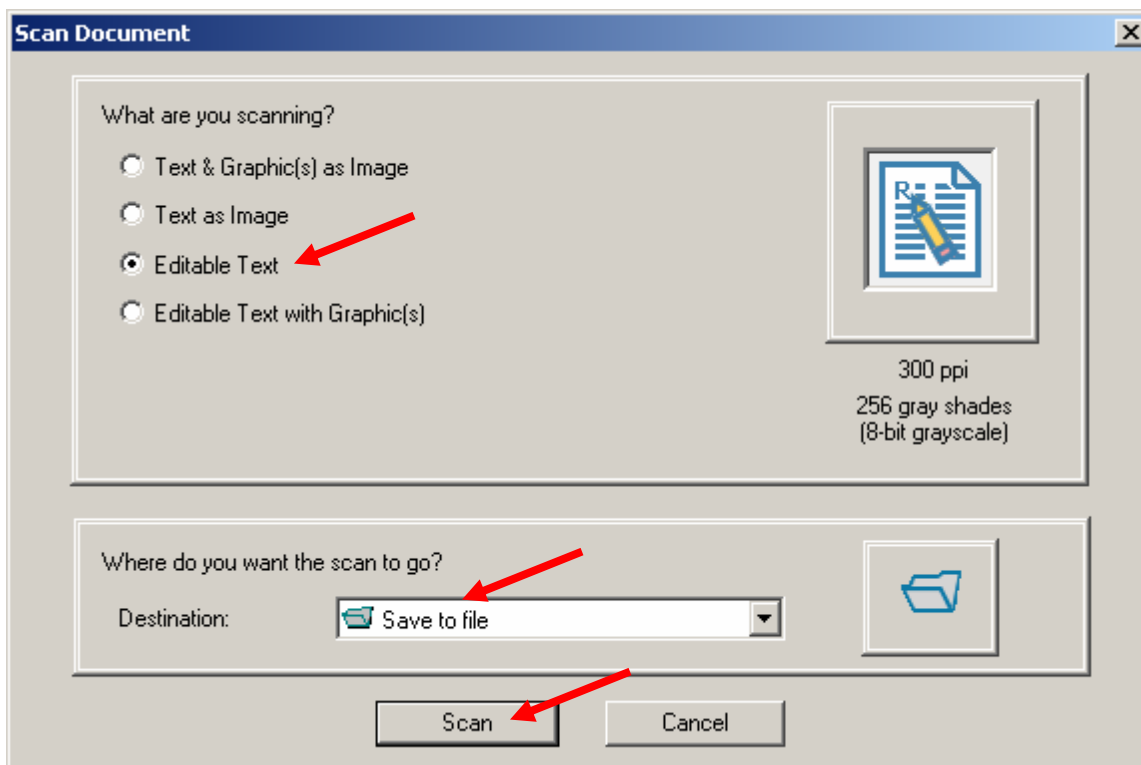
1. Turn scanner on.
2. Place document (up to 35 pages) in automatic feeder. Adjust sidebars to paper width.
3. Click on HP Director icon.



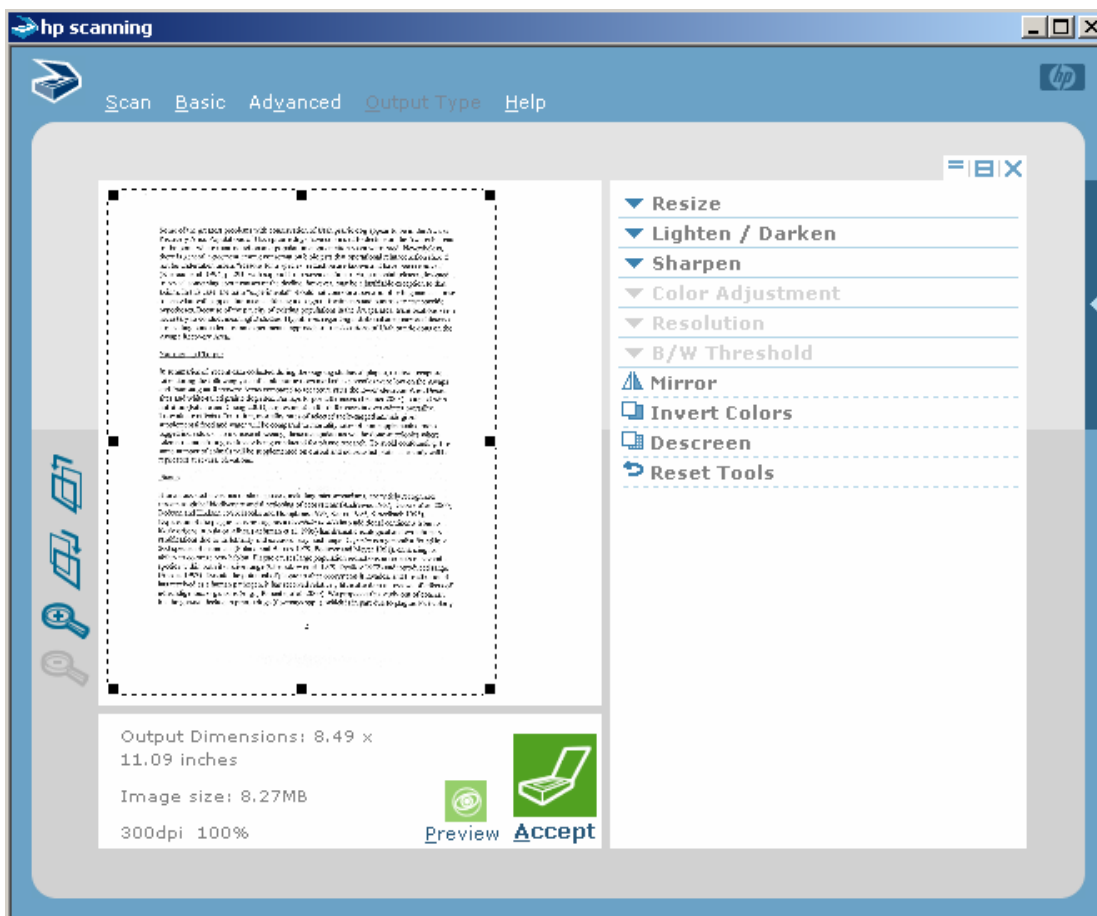
4. Click on Scan Document and



select Editable Text with a Destination of Save to file. Select Scan.



5. Document will scan automatically. After all pages are scanned, adjust settings (Lighten/Darken, Sharpen, etc.) as necessary and select Accept.

Attachment B. Scanner instructions for hp scanjet 5550C scanner

6. Save file in desired folder (as pdf). Review pdf document for format accuracy. If you are scanning several documents into one pdf file, you can separate them out at this time and save them as separate files.

Attachment C: NatureBib full-text document upload - Copyright status checklist

[illegible]

Appendix C. NCPN user guidelines for Dataset Catalog



**Northern Colorado Plateau Network
Inventory and Monitoring Program**

National Park Service
U.S. Department of the Interior

Dataset Catalog Data Entry Guidelines

Introduction

The National Park Service Dataset Catalog is an instrument for providing metadata and keeping inventory of a variety of natural resource-related data sets created or managed by parks or networks. Data sets can include assemblages of field forms or raw data, spreadsheets, stand-alone databases, and other materials such as assemblages of aerial photographs, slides or photographs.

The Northern Colorado Plateau Network (NCPN) uses Dataset Catalog for documenting datasets that are primarily non-spatial, or that have a spatial component that is complementary or supplemental to the data set. Spatial data sets are documented per FGDC metadata standards using the ArcCatalog tool in ArcGIS.

The Dataset Catalog is distinct from the NatureBib database, which is used for tracking published materials, journal articles, gray literature, reports, maps, or information that has been synthesized, interpreted, or otherwise assembled into a product.

The current version (v3) of the Dataset Catalog is a relational database that can be shared among NPS units and is included in the Servicewide system on the internet at <http://science.nature.nps.gov/im/apps/datacat/>. This version includes updated Help Files and a training session that can be accessed at the end of the help files. Dataset Catalog now exports records in XML format for interchange with the on-line NR-GIS Data Store application, the NPS Metadata Tools and Editor or with ArcCatalog.

This data entry guide has used the standard Dataset Catalog help records as a starting point; however, we have made some modifications specific to the Northern Colorado Plateau Network in order to provide additional guidance, clarity, or standardization during the data entry process. The standards presented here have precedence over standards that appear in the on-line help records.

Creating a Dataset Catalog Record

In order to create a catalog record you will need to understand and evaluate the material you are cataloging. In many instances this will not be a quick or easy process. The goal to keep in mind is to create a high-quality, accurate, and informative record that will serve a wide range of users over the long term. The credibility of any data set is eroded by misspellings, geographic errors, or inconsistencies, so attention to detail is paramount. In particular, you will need to determine:

1. subject categories and keywords
2. a short data set title
3. the contact person for the data set
4. a concise description of the data
5. purpose of the project
6. time frames
7. additional documentation and data sets relating to the data
8. the data type and names of tables and/or layers comprising the data set
9. status and update frequency for the data set
10. geographic location of the study

11. data quality
12. data format and file size
13. the file location and how it can be distributed
14. the sensitivity of the data for possible access restrictions

Dataset Catalog Records

1. A data set contains data collected for a single objective.

Example: *The park's aquatic macroinvertebrate monitoring protocol calls for taking insect samples, measuring discharge, recording water chemistry parameters, and performing a suite of habitat measurements. Although the focus of the project is the insects, the other data are important companions and may be critical to the interpretation of the insect data.*

2. Where the same information objective is pursued using different methodologies, each should be cataloged separately but share Subject and Keyword elements.

Example 1: *Air quality and visibility sampling is measured using camera, transmissometer, and via multi-agency devices and protocols. Each data set relates to visibility, but the methods, time intervals, and resulting data sets are quite distinct; thus, each gets its own catalog entry. Using the same keyword (e.g., visibility) will identify all three data sets, and allow the data sets to be easily discovered in a search.*

Example 2: *A second example is Shenandoah's three "bird census" methodologies: the MAPS program (net capture), Breeding Bird Survey (point counts), and transect surveys (visual and voice). Whereas each bird census results in complementary, but different, kinds and qualities of data, they are cataloged separately.*

3. If the same type of data is gathered using different protocols, each data set gets its own catalog entry.

Example: *Stream chemistry parameters are measured by park staff during resource monitoring activities, wastewater effluent evaluation, and potability studies. Even if all three sought only temperature, pH and dissolved oxygen, the difference in data collection is significant and reflects real differences in equipment, methodology, training, accuracy, and resolution. Each data set gets its own catalog entry.*

4. As a general rule, data sets entered into the Dataset Catalog should be housed, managed, or directly accessible by the park. The catalog record is used for long-term documentation of the data, and as a means of searching, sorting, and printing information on park data sets.

Example 1: *A report prepared by a contractor contains information on the location and distribution of a subset of bird species in a park. Report appendices contain summary tables with locations, species, dates, and additional observation information; however, the raw data resides with the contractor. Since the full data set is not housed or managed by the park, create a NatureBib record for the report, indicating in the abstract the content and extent of the appendices. If, however, the full data set were provided to the park along with the report, you would create a NatureBib record for the report and a Dataset Catalog record for the data.*

Example 2: *If a data set exists as a supporting element of another data set it would NOT get its own Dataset Catalog record. An example would be a vegetation monitoring study where direct measurements of species abundance or cover were made and entered in a database. If photos of the plots were also taken but were not the primary means of measuring vegetation change, the photos would be included as a Related Data citation within the vegetation monitoring database Dataset Catalog record. However, if a vegetation monitoring study was initiated using locations identified from an already existing set of photos taken for another purpose (say historical photos of prominent park landscape features) the photo set and*

the vegetation monitoring database would get separate Dataset Catalog records and probably point to each other as Related Data. The decision about whether a data set stands on its own may not always be clear. Discussing a problematic data set with other data staff can sometimes be helpful in making a decision.

5. Records for data sets that span multiple parks are entered into one record with each park code entered into the **Unit Code(s)** field.

Overview of the Steps in Record Processing

Some of the procedures listed here may seem cumbersome or redundant; however, they represent safeguards until the system is refined and we fully understand how it will function in the long run.

Step 1. Carefully review and evaluate the data set.

Step 2. A unique record identification number is automatically generated in the **ID** field (located above the **Close** button in the lower left of the screen). If a record is deleted, its **ID** number will not be reassigned. In the previous versions of Dataset Catalog, a unique identification number was assigned by staff members and entered into the **Proj. ID** field. This field is retained in the new version of Dataset Catalog for reference only. Records should now be identified by the **ID** field number. Record the Dataset Catalog **ID** number on hard-copy data sets (e.g., DSCAT ID 15) where appropriate.

Step 3. Use the hard-copy transcription form as needed to assemble information on the data set. Park contacts can also fill out a hard-copy or electronic transcription form to provide record information to be entered into Dataset Catalog (Attachment A).

Step 4. Enter data into the database form.

Step 5. Print out a hard-copy of the record and double-check against the hand-written or computer-generated (from Park contacts) transcription form.

Step 6. Make any corrections and if necessary, re-print record.

Step 7. Staple final printed record to original transcription form (if used) and file by Park and then by ID number. If associated information is available on the data set (e.g., sketch of survey route, database structure summary), staple it to the printed record as well. Associated information (reports, maps, hard-copy of data, etc.) should be labeled with the Dataset Catalog **ID** number and filed in the Inventory and Monitoring Program data management library.

Data Entry Instructions and Field Descriptions

To promote consistency in data entry, field descriptions, data entry guidelines, and examples have been outlined in the table below.

The one-page Dataset Catalog form appears below. Note that in addition to the table of field descriptions and data entry instructions list below, very useful help files have been incorporated into the Dataset Catalog database. These files can be accessed in two ways:

- 1) press the **DatCat Help** button in the upper right corner and search for a topic of interest, or
- 2) place the cursor in a field and press **F1** to immediately get help on the field in question.

Contact **NPS Information Resources Dataset Catalog** **DatCat Help**

UnitCode(s): ZION **Create Date:** 20011014 **Location:** Sample sites located on the Virgin River and it's tributaries. Most sites within Zion NP, but some located

Unit Info **Cat. Date:** 20050802 **Bounding Rectangle** **West-East Longitude:** **North-South Latitude:**

Dataset Title: Bacterial water quality data, 2000-2001, Zion NP **Coverage** IN&OUT **UTM Zone:** 0

Version: **Proj. ID:** DS-ZION-0007 **Data Types Information** DIGDB **Coord. System:** **Datum:**

Permit #: **Proj. No:** **Contact:** Sharrow, Dave - National Pa

Keywords: water quality **Theme:** **Thesaurus** bacteria **Theme:** turbidity **Theme:**

Abstract: **Clear** **Subject:** Water Quality

This is a two-year study of bacterial water quality along the Virgin River and it's tributaries within and near Zion National Park. Data were collected in 2000 and 2001. Approximately 600 samples were collected at 16 sites

Purpose: **Clear**

The purpose of this study was to determine water quality conditions and the risk to visitors engaged in water play at Zion National Park. Emphasis was

Related Citations: **Related Docs.** **Related Data** **Source**

Assessment of bacterial water quality and threats to recreationists in: doc. Bacterial analysis of the water resource of the North Fork of the Virgi: doc.

Table/Layers **Source Info** **Type:** **Edit Type** **Scale:**

00Bact Attribute **Dataset Date(s):** **Update Frequency:** Unknown **Status:** Inactive **Progress:** Complete

bact01 Attribute **Single:** **Begin:** 20000608 **End:** 20010921 **Multiple:** **ID:** 381 **CITE_ID:** 4160

Close

Metadata Information **Data Protection Information**

Metadata Contact: Powell, Missy **Sensitive?:** No **Sens. Type:** **Classification:** N/A **Restrictions:**

Status: Complete **Standard:** NPS DatasetCatalog **Version:** **Priority:**

Record Operations

Create New Record **Copy Current Record** **Delete Current Record**

Export XML Files **Export Text Files** **Import FGDC .txt File**

Save Record **Browse Records** **Reports**

Create a new Dataset Catalog record by pressing **Create New Record** in the lower center of the form. Enter the data set information into the fields using the following guidelines. Fields followed by an asterisk (*) are required.

Field Name	Description/Instructions	Example(s)
UnitCode(s)*	Enter or select the four-letter code(s) for the park(s) to which the data set corresponds.	ARCH CANY
Unit Info	All network parks' contact information should be entered in the Unit Info field. Changes can also be made here.	
Create Date	The database program automatically enters the create date for the record. Functionality has been added in v.3 for editing the Metadata Create Date when needed.	

Field Name	Description/Instructions	Example(s)
Cat. Date	The database program automatically enters here the last date edits were made to the record.	
Dataset Title*	<p>Press the Dataset Title button. This pulls up the Citation Management text box. Enter the name of the <i>Originator/Author</i> of the data set, last name first, then a concise data set <i>Title</i>.</p> <p>Follow standard citation guidelines and capitalize only the first letter of the title and any subsequent proper names. Begin the title by using words that indicate the subject of the title; then continue by further describing the subject; follow with the year(s); and finally, the park name followed appropriately by NP or NM. If multiple parks are involved, enter up to 3 or 4 parks; otherwise enter, e.g., “4 NCPN park units”, or “NCPN” if all 16 parks are included. (Make sure the title describes the data set, not the associated project.)</p> <p>Because the search for a subject or keyword will result in a list of the titles, the title should be sufficiently distinct to direct the data explorer to it. It may be useful to include, in parentheses, the originator’s last name (see examples).</p> <p>Once you have completed entry, press the SET AS: Data Set Citation button, then Close the form to return to the main Dataset Catalog form. The other fields on the citation form are optional.</p>	<p><i>Examples or Data set titles:</i></p> <ul style="list-style-type: none"> • <i>Bird banding data, 1998-1999, Zion NP and Pipe Spring NM</i> • <i>Bird banding data, 2004, Zion NP</i> • <i>Herpetofauna inventory, 2001-2002, 11 NCPN Parks</i> • <i>Raptor monitoring data, prior to 1994, Zion NP, Cedar Breaks NM, & Pipe Spring NM</i> • <i>Exotic plant species database (Mason 1995-1999), Zion NP</i>
Version	Edition or version of work, if applicable.	
Permit #	Enter Park research permit identification number, if applicable.	
Proj. ID	A Project ID is no longer assigned to a Dataset Catalog record. This field is retained in the new version for reference only.	
Proj. No	Enter park in-house identification of associated project, if applicable.	
Contact*	<p>Press the Contact button to move to the Dataset Contact Information form. The data set contact person field is the person and position to which inquiries about the data set can be directed. Often this will be the park biologist or resource manager. On the pull-down list, select the contact name, if available.</p> <p>To add a new contact name to the list, press the Contact button and provide the organization, name, position, and contact information in the space provided. Note that selecting the Primary contact as Organization or Person (upper right) determines the field that will be printed in your reports. If the address of the contact person is not on the address pull-down list, press Add/Edit Address to enter new information. When complete, press Add New under Contact Record Operations, and in lower right of form, set as Dataset Contact and/or Metadata Contact.</p>	

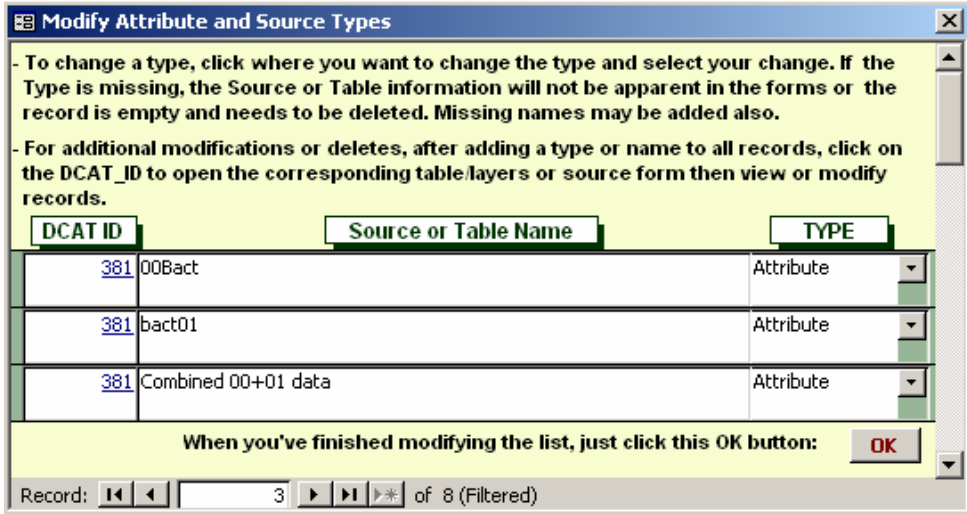
Field Name	Description/Instructions	Example(s)
Keywords*	First, enter at least one “topic area” (broad term) and then any other “standardized keywords” (more general terms) from the list of I&M Standardized Keywords (Attachment B). These same keyword standards are used to add keywords in NatureBib. Given that record searches rely on keywords, the use of established keywords promotes consistency, ensuring successful, comprehensive results.	<i>For the record titled, Bird banding data, Zion NP, enter topic area, <u>Animal Studies</u>, and standardized keywords, <u>birds</u> and <u>inventory</u>. Then add any additional appropriate keywords such as <u>mist-netting</u>, <u>banding</u>, etc.</i>
Thesaurus	Enter additional keywords by pressing the Thesaurus button and reviewing the list of options. The keyword thesaurus is a Windows help file that is searchable, clippable, and pasteable into any Windows software. If you don’t find applicable keywords from the Thesaurus , you can enter additional terms directly into the Keywords field. Keywords can include Latin names, geographic place names, survey techniques, etc.	
Subject*	Subject is selected from a pull-down list derived from the Investigator’s Annual Report subject list. Only one value may be selected from the list. <u>Note:</u> Both Keyword and Subject fields are the primary tools for retrieving information, so carefully evaluate the source and your choice, and think of the applications of the data set.	
Abstract*	Enter a concise description of the data set. Include information such as the project from which the data are derived, general methodology used (#sites, sampling frequency, protocol, equipment), and any references to concurrent or related data. If a data set spans multiple parks, describe the full extent of the data set in the Abstract and indicate that it encompasses multiple parks. If the data set is in manual form only (e.g., field data sheets/forms), list the individual data fields (e.g., genus, species, weight, color, etc.). If data are in an electronic format, refer to the Table/Layers section of this document.	
Purpose*	Purpose should answer the questions: why were the data collected, and what uses or information will the data provide? Field length is limited. Be concise.	

Field Name	Description/Instructions	Example(s)
Related Citations	<p>Due to its complexity, an expanded description of this section follows.</p> <ul style="list-style-type: none"> The <i>Citation Management</i> text box is opened when Related Docs, Related Data, or Source is selected (see additional information on these topics after this section). Several tab sections are available: Data Set Citation (data set title information), Data Source Citation(s), Related Data, Related Documents, and Add, Edit, Link, and View All Citations. There is an option to Hide other citation tabs (upper center) in order to view a single selected tab. Action buttons are listed on the bottom of the <i>Citation Management</i> form. <ul style="list-style-type: none"> Add New – use to create a new citation record. Edit – use to edit a citation record. Dissociate – simply removes the link between a citation record and a Dataset Catalog record. Delete – eliminates the citation record from the database. Close – closes the <i>Citation Management</i> form. All previously entered citations can be viewed from the Add, Edit, Link, and View all Citations tab. (Move through the record number in the lower left of the screen.) A single citation may be linked to several different Dataset Catalog records. The Find Citation button can be used to search for a previously entered citation. For a citation to be associated with a Dataset Catalog record you <u>must</u> SET AS: Data Set Citation, Source Citation, Related Data Citation, or Related Docs. Citation (lower portion of screen). Otherwise, the citation record information will be given a CITE ID and is listed in the tab section Add, Edit, Link, and View All Citations, but is not associated with a Dataset Catalog record ID. 	

Field Name	Description/Instructions	Example(s)
Related Citation – Related Docs.*	<p>Use this option if a report, publication, or other type of synthesis has been created for the data set, or if a document has direct relationship to the data set.</p> <p>Open the <i>Citation Management</i> form by clicking the Related Docs. Button. The form will open to the Related Documents tab.</p> <p>Select the Add, Edit, Link and View All Citations tab form and then Find Citation in the lower left corner to determine if the document citation has been previously entered. If found, press the SET AS: Related Doc. Citation button to link the citation to the current metadata record. Then press Close (lower right corner).</p> <p>To enter a new Related Document citation, after creating the associated NatureBib record, press the Add New button on the <i>Citation Management</i> form. Enter the BibKey_ID, author, citation title, and date information. Click the SET AS: Related Doc. Citation button to add the citation record. Close.</p>	<p><i>The database of bird observation data resulted in a series of four reports summarizing survey results. Four report records should be created in NatureBib and the Bibkey IDs entered in four Related Documents records.</i></p>
Related Citation – Related Data	<p>Data that are auxiliary or support a primary dataset and that could not reasonable stand on their own as a metadata record should be documented as a Related Data Citation. Related data sets may include physical or biotic data collected at the same time or in close proximity to the current data set, a set of related hard-copy maps, or a collection of photographs.</p> <p>Open the <i>Citation Management</i> form by clicking the Related Data Button. The form will open to the Related Data tab.</p> <p>Select the Add, Edit, Link and View All Citations tab form and then Find Citation in the lower left corner to determine if the document citation has been previously entered. If found, press the SET AS: Related Data Citation button to link the citation to the current metadata record. Then press Close (lower right corner).</p> <p>To enter a new Related Data citation, press the Add New button on the <i>Citation Management</i> form. Enter the author, citation title, and date information. Click the SET AS: Related Data Citation button to add the citation record. Close.</p>	<p><i>A database of multiple years of bird observation data is accompanied by a set of photographs of the transect locations. These locations have also been digitized and exist as a GIS coverage. Suggested way to proceed: create a full Dataset Catalog record for the database. Under Related Data create one abbreviated record for the photographs, and one abbreviated record for the GIS coverage. If a metadata record has been created for an associated GIS coverage, enter the abbreviated record that describes the coverage and ask your GIS specialist about the best way to refer to the coverage and metadata record.</i></p>

Field Name	Description/Instructions	Example(s)
Related Citation – Source*	<p>Source would be used to document third party data used as an integral part of creating the current data set. A source citation may be referencing a document that describes the origin of information in the dataset (e.g., a journal publication or a study report).</p> <p>Open the <i>Citation Management</i> form by clicking the Source Button. The form will open to the Data Source Citation tab. (Note that the Source Information Form button appears in blue below the Source Citation form. See Source Info below for more information on this button.)</p> <p>Select the Add, Edit, Link and View All Citations tab form and then Find Citation in the lower left corner to determine if the source citation has been previously entered. If found, press the SET AS: Source Citation button to link the citation to the current metadata record. Then press Close (lower right corner).</p> <p>To enter a new Source citation, press the Add New button on the <i>Citation Management</i> form. Enter the author, citation title, and date information. Click the SET AS: Source Citation button to add the citation record. Close.</p>	<ul style="list-style-type: none"> • <i>A network-wide water quality database created by USGS contains information from the national STORET database.</i> • <i>Bureau of Mines map of abandoned mines is used for site selection for bat inventories. The map information would be set as a Source Citation.</i>
Table/Layers, Source Info, & Edit Type - General	<p>Use this for electronic format data only! This set of forms is for documenting the structure of spreadsheets, databases, word processing tables, GIS coverages (that have not necessarily had metadata records created), or other data formats.</p> <p><u>Note:</u> Often, there will be GIS coverages that are associated with a data set, but which are not the actual data set you are documenting. An example would be a data set entitled ‘Soundscape Monitoring’, which comprises .wav files and an Excel spreadsheet. Together with these, you have two GIS shape files – one with sound monitoring station points, and one of helicopter survey routes. The quandary is, where do you put the GIS coverages – under Tables/Layers, or under Related Data? In this example, since the coverages are directly related to the data set, you would put them under Table/Layers. Otherwise, any ancillary GIS coverages (e.g., a digitized quad map) would go under Related Data. Remember, the GIS coverages you document here actually only <u>point</u> to the coverages that exist at the park where the data set is housed. In theory, there should be a complete, FGDC-compliant record associated with each GIS coverage.</p>	

Field Name	Description/Instructions	Example(s)
Table/Layers *	<p><u>Importing with harvester.</u> There is a new feature in Dataset Catalog called a data dictionary “harvester”. When you press the Table/Layer button, you have the opportunity to import an Access file (.mdb), which will automatically populate the data dictionary fields for you. (Note: In order to import Excel spreadsheets using the harvester, you must first import the .xls file into Access.) Press the Import button, browse, highlight, and <i>Select</i> the .mdb file. The harvester will automatically fill in the data dictionary tables and fields. You will be asked if you want to consider adding field domains for the fields from the database for each table. Just say no.</p> <p><u>Entering manually (non-GIS data).</u> If you do not have an .mdb, or are unable to convert the data to an .mdb file (and therefore, are not using the harvester tool), you can type in the information for the individual fields. Press the Table/Layers button. Next press the View/Enter button under the Data Dictionary section of the text box. If there are no other entries here, you will automatically be prompted to enter new data. Otherwise, move to the next blank record using the arrows in the lower left corner.</p> <p>Table File Name. Fill in the file name (e.g., ripbirds.xls).</p> <p>Table Name. If working with an Excel table, this entry will equal what is listed under Table File Name (e.g., ripbirds.xls) or it could be the individual worksheet names in Excel. If working with an Access database, this entry will equal the Access table name (e.g., tbl_birdObs or tbl_birdNames).</p> <p>Table Description. Enter a brief description of what the table, spreadsheet or data file contains.</p> <p>Spatial Theme. Skip.</p> <p>Spatial Theme Definition. Skip.</p> <p>Table Format. Select from the pull-down list - Dbase, Access, Excel, Word, etc.</p> <p>Enter the individual field names, types, sizes, and descriptions for the data set.</p> <p><u>Entering manually (GIS data).</u> To fill in information about GIS shapefiles, use the following example. You have a GIS coverage for a 2002 sound monitoring station:</p> <p>Table Filename. Enter the GIS project file name (e.g., sndmonit.apr or sndmonit.mxd).</p> <p>Table Name. Enter the name of the shapefile (e.g., 02stations.shp)</p> <p>Table Description. A place for any additional information about the GIS file you care to enter (e.g., “Field stations of routine sound monitoring, stationary sites set up on solar panels and battery operated”)</p> <p>Note: Ignore that this field is for “table description”, as you are actually entering a “shapefile description”.</p> <p>Spatial Theme. What sort of spatial theme is this coverage? Examples could be a vegetation coverage, a road coverage, a park boundary coverage. For this example, you would enter “Sound monitoring stations”.</p> <p>Spatial Theme Definition. For this example, enter “Sound monitoring at BRCA. Park Clip coverage/GEOVEC/Point/UTM/NAD83” – there are really no hard and fast rules about what has to go where, just be sure you capture all of the information you have on your GIS files somewhere in this subform.</p> <p>When finished, press Close to go back to the Dataset Table Information form. If you have multiple tables or several worksheets to document, repeat the process by entering the next Table Name (shapefile).</p>	

Field Name	Description/Instructions	Example(s)
Source Info*	Use the Source Information Form to create a source record for information that describes data in the data set. See the DatCat Help files for detailed information on this field.	
Edit Type*	<p>In the current version of Dataset Catalog (v3), Table/Layers and Source are separate fields. The Edit Type field was added so operators could assign a type (attribute or source) to previously entered Table/Layers and Source data. You will not be able to view previously entered Table/Layer data field entries unless an attribute type is assigned to the data.</p> 	
Dataset Date(s)*	<p>Single. For one-time-only studies, use the single date field.</p> <p>Begin and End. Use begin date and end date to indicate starting and ending points (e.g., 12/13/1986 - 08/19/1996) of data collection for inactive/complete data sets. If the data set is still active and in work, enter the beginning date only. The overall time span of the data set and any periods of record should be recorded even if there are time gaps when no data collection occurred.</p> <p>Multiple. For multiple dates data sets, enter each date on which data were collected.</p> <p><u>Note:</u> Date fields will accept full day-month-year or year. If you know only the month and year, enter 01-month-year, then enter into the Comments field that the date is accurate to month and year only.</p>	
Update Frequency	The interval at which new data are appended to the data set. Values are <i>continually, daily, weekly, monthly, annually, biannually, as needed, irregular, none planned, and unknown.</i>	
Status*	<p>This field indicates the status of the data set activities. Several values are available in the pull-down list. To avoid multiple interpretations of the terms presented, you can limit your choices to either Active or Inactive, which should accommodate most circumstances.</p> <ul style="list-style-type: none"> • Active Data are still being added to the data set periodically • Inactive Data are no longer being collected but may have future updates 	
Progress	<p>The progress generally depends on the Status of the data set.</p> <ul style="list-style-type: none"> • In Work Data are in development or still being collected and added to the data set (for all Active data sets) • Complete Data are no longer being collected but may have future updates (for all Inactive data sets) • Planned For a data set in the conceptual or planning stage 	

Field Name	Description/Instructions	Example(s)																
ID*	The ID field is automatically populated by Dataset Catalog with a unique ID number for each newly-created record. If a Dataset Catalog record is deleted, the ID number for that record is not used again.																	
CITE ID	When a new citation is added in the <i>Citation Management</i> text box, the CITE ID is automatically populated by Dataset Catalog with a unique citation identification number. This number is also located in the upper left corner of the <i>Citation Management</i> text box tab, Add, Edit, Link, and View All Citations .																	
Location*	Briefly describe the geographic location to which the data set corresponds. Use descriptive terms, place names, sites, etc. (Note: Field length is very limited. If more room is needed, add information in the Comments field.) If you are entering information on a data set that spans multiple parks, this field should contain location data on all parks.																	
Bounding Rectangle	<p>If known, enter the longitude and latitude coordinates (in decimal degrees) of the study area’s bounding rectangle. If the study area is confined to a specific locality, enter the approximate center of the study area (make the east-west and north-south lat-long values identical to indicate a point).</p> <p>Converting degrees-minutes-seconds to decimal degrees Divide the minutes by 60 and the seconds by 3600. Then the degrees (converted minutes and seconds) are summed. Example: 112 23 44: 23/60 = 0.38; 44/3600 = 0.0122; 0.38 + 0.0122 = 0.3922. Decimal degrees = 112.3922</p> <p>If a single park or network is the study area, the park's or network’s bounding rectangle may be selected from the lookup table by clicking on the Default Rectangle button.</p> <p>The Lat/Long or UTM coordinates of the approximate center of the study area may be used instead of a bounding rectangle. Default centroids for single Parks or Networks can be selected from the lookup table by clicking on the Default Centroid button.</p>																	
Coverage*	<p>Coverage refers to the spatial association of the dataset relative to the park(s) or network. Press the Coverage button for options.</p> <table><tr><td>IN</td><td>Data were collected completely inside of the park or network boundary.</td></tr><tr><td>OUT</td><td>Data were collected completely outside of the park or network boundary.</td></tr><tr><td>IN&OUT</td><td>The dataset was collected both inside and outside the park or network boundary.</td></tr><tr><td>Park Clip</td><td>The dataset was clipped to include the whole park by only up to the park or network boundary.</td></tr><tr><td>Park Area</td><td>The dataset includes the whole park or network and some surrounding area.</td></tr><tr><td>Network-Wide</td><td>The dataset includes data across an I&M Network.</td></tr><tr><td>Region-wide</td><td>The dataset includes data across an NPS Region.</td></tr><tr><td>NPS-wide</td><td>The dataset includes data across the National Park System.</td></tr></table>		IN	Data were collected completely inside of the park or network boundary.	OUT	Data were collected completely outside of the park or network boundary.	IN&OUT	The dataset was collected both inside and outside the park or network boundary.	Park Clip	The dataset was clipped to include the whole park by only up to the park or network boundary.	Park Area	The dataset includes the whole park or network and some surrounding area.	Network-Wide	The dataset includes data across an I&M Network.	Region-wide	The dataset includes data across an NPS Region.	NPS-wide	The dataset includes data across the National Park System.
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Region-wide	The dataset includes data across an NPS Region.																	
NPS-wide	The dataset includes data across the National Park System.																	
UTM Zone	Enter the UTM Zone here. This will be automatically populated through use of the default buttons in the Bounding Rectangle field.																	
Coord. System	Geographic coordinate system of the data can be selected from a pick-list: <table><tr><td>Albers</td><td>Conical_Equal_Area</td></tr><tr><td>Geographic Lat/Long</td><td>Latitude and longitude</td></tr><tr><td>State Plane</td><td>State Plane (feet)</td></tr></table>		Albers	Conical_Equal_Area	Geographic Lat/Long	Latitude and longitude	State Plane	State Plane (feet)										
Albers	Conical_Equal_Area																	
Geographic Lat/Long	Latitude and longitude																	
State Plane	State Plane (feet)																	

Field Name	Description/Instructions	Example(s)
	UTM Universal Transverse Mercator (meters) Other User defined (free text 255)	
Datum	Geographic datum for the dataset's coordinate system, selected from a pick-list. NAD27 North American Datum of 1927 NAD83 North American Datum of 1983 Other User defined	
Data Types Information	<p>The Data Type is the physical (i.e., analog) or digital medium in which the data exist. For identification of the data type in the data set catalog, use one of the acronym codes below:</p> <p><i>Spatially Georeferenced Data sets</i> GEORAS = Digital Raster Data (e.g., GRID, IDRISI, etc.) GEOVEC = Digital Vector Data (e.g., ARC, Atlas, etc.) GEODB = Digital Database (e.g., DBASEIII+, ASCII, Access)</p> <p><i>Non-georeferenced Data sets</i> DIGRAS = Digital Raster Data (e.g., SURFER, etc.) DIGVEC = Digital Vector Data (e.g., AutoCad, etc.) DIGDB = Digital Database (e.g., DBASEIII+, ASCII, Access)</p> <p><i>Analog (i.e. Hardcopy) Data sets</i> ANAORG = Organized Database (e.g., field forms, tables, etc.) ANAUNO = Unorganized Database (e.g., unsorted files, etc.)</p> <p>If the data set contains data in more than one format (e.g., field forms and a spreadsheet), select the highest level of organization. In general, data that is ANAUNO would likely be entered as a NatureBib record; while ANAORG data could comprise a data set.</p>	
Format*	Further specify the format(s) in which the data set resides (e.g., software version, digital file, or analog format used to manage the data).	<ul style="list-style-type: none"> • <i>dBase III+ files and hard-copy field forms</i> • <i>MSAccess 2000</i>
Conversion?	Indicate if the data is in a format that needs conversion before the data may be used (e.g., GRASS or an out-of-date database system format).	
File Size (MB)	Enter file size in megabytes.	
File Location*	The physical location or computer where the original data or database resides. This could be a file cabinet, local computer, server, etc. Both a computer file name and physical location for hard-copy forms may need to be entered for data sets that are in multiple formats. Keep the names generic as exact paths or file cabinets will change over time (e.g., wildlife biologist computer, or park network resource management file).	
At Park?*	Indicate if the data set is located at the park or off-site.	
Distribution Cost	Enter information about distribution costs related to the data set, if any.	
Distribution	The means of dissemination of the data can be recorded here. If the data set will be available on the Internet, the URL (e.g., www.something.com, ftp.something, etc.) should be given. NCPN enters the contact position, phone #, and park central email information address.	
Online Link	If the data set is available via the web, press the Online Link button and enter the corresponding URL and a brief description of the site. Enter the main link (which leads to another link for the data), not the direct link.	Enter <i>http://www2.nature.nps.gov/air/maps/airatlas/index.htm</i> in the Online Link field. This site will provide a "Download Data" link where one can download air quality data.

Field Name	Description/Instructions	Example(s)								
Data Quality	With most non-geospatial data the state of verification, validation, or use of the data will not be certain. Select Unknown unless you have confirmation of verification or validation routines that have been run on the data set. Press the Data Quality button to see definitions of values from the pick list.									
Quality Report	<p>Enter an assessment of the overall quality and utility of the data set. A quality assessment can be made by the person creating the Dataset Catalog record, or by someone who is knowledgeable about the data (e.g., creator, user). Items to consider in your assessment include:</p> <ul style="list-style-type: none">• Documentation of and adherence to protocols• Qualifications of observers or data collectors• Consistency of observers or data collectors (e.g., high staff turnover that could result in variability?)• Protocols and/or equipment used (e.g., current vs. outdated methods, quality and performance of equipment)• Volume of data collected and duration of study• Accuracy, consistency and completeness of data collection and data entry• Documentation and precision of location data• Level of synthesis or interpretation of raw data <p>If a quality assessment is made, the opinion should be substantiated. Conclude the quality assessment with the name and affiliation of the person making the assessment, and date in parentheses.</p>									
Comments	Enter any additional comments you have on the data set. This should include any information about dates that are incomplete (see date fields), and can also include information on persons who previously contributed to the data set (and who are not listed under Contact).									
Metadata Information - Metadata Contact	Enter name of the NCPN data management staff member entering the record information, unless there is a local, park-based data manager who has made the Dataset Catalog record and who is familiar with the metadata.									
Metadata Information – Status	<p>The status of metadata documentation for this data set. Values are:</p> <table><tr><td>NONE</td><td>There are no formal metadata for data set.</td></tr><tr><td>PLANNED</td><td>Formal metadata standard documentation is planned for data set.</td></tr><tr><td>IN WORK</td><td>Formal metadata standard documentation is in progress for data set.</td></tr><tr><td>COMPLETE</td><td>A metadata standard record has been completed for this data set.</td></tr></table>		NONE	There are no formal metadata for data set.	PLANNED	Formal metadata standard documentation is planned for data set.	IN WORK	Formal metadata standard documentation is in progress for data set.	COMPLETE	A metadata standard record has been completed for this data set.
NONE	There are no formal metadata for data set.									
PLANNED	Formal metadata standard documentation is planned for data set.									
IN WORK	Formal metadata standard documentation is in progress for data set.									
COMPLETE	A metadata standard record has been completed for this data set.									
Metadata Information – Standard	<p>Indicate which metadata standard was used to document this data set. Values are:</p> <table><tr><td>FGDC</td><td>One of the available FGDC metadata standards or profiles has been completed.</td></tr><tr><td>NPS Dataset Catalog</td><td>This Dataset Catalog record will be the only standard metadata record for this data set.</td></tr><tr><td>NONE</td><td>No metadata standard has been completed.</td></tr><tr><td>OTHER</td><td>If a different metadata standard is applicable, OTHER may be edited with an abbreviated name, and the standard should be described in Comments</td></tr></table>		FGDC	One of the available FGDC metadata standards or profiles has been completed.	NPS Dataset Catalog	This Dataset Catalog record will be the only standard metadata record for this data set.	NONE	No metadata standard has been completed.	OTHER	If a different metadata standard is applicable, OTHER may be edited with an abbreviated name, and the standard should be described in Comments
FGDC	One of the available FGDC metadata standards or profiles has been completed.									
NPS Dataset Catalog	This Dataset Catalog record will be the only standard metadata record for this data set.									
NONE	No metadata standard has been completed.									
OTHER	If a different metadata standard is applicable, OTHER may be edited with an abbreviated name, and the standard should be described in Comments									

Field Name	Description/Instructions	Example(s)
Metadata Information – Version	The version number of the metadata standard used to document the data set. This is usually located on the cover and/or in the page headers of the standard.	
Metadata Information – Priority	<p>Enter the priority level for completing metadata. One factor to consider in assigning priority is how widely the data set is or will be used or distributed—those sets with high use would be a high priority.</p> <p>HIGH Metadata standard completion is of highest priority.</p> <p>MEDIUM Metadata standard completion is of intermediate priority.</p> <p>LOW Metadata standard completion is a low priority.</p>	
Data Protection Information	<p>The deliberate withholding of publicly-owned information is valid only when those data are specifically protected under existing law. The locations of caves/caverns and archeological sites on federal lands currently have this level of protection, and similar defenses should be available for T&E species and critical habitats. Typically, though, there are no legal restrictions regarding access or use of resource data sets. There are currently no formally-established standards within network parks on what constitutes “sensitive” records. Until these standards are established, it is appropriate to provisionally designate as “sensitive”, data sets that contain information on T&E species or other resources that, based on park or staff knowledge, could be at risk if information is widely distributed (e.g., peregrine nest locations, cacti that are under collection pressure).</p> <p><u>Sensitive?</u> Yes/No</p> <p><u>Sensitivity Type</u> If you selected “Yes” above, choose the reason the data set is sensitive. Applicable categories are: archaeology, cave, classified, law enforcement, paleontology, T&E species, and other.</p> <p><u>Classifications</u> N/A</p> <p><u>Restrictions</u> Choices are Public Access Denied, Federal only, NPS only, and Park only.</p>	

Quality Control/Quality Assurance

Completing metadata for some data sets may require investigation, especially for legacy data sets. As this may be a time-consuming process, it is most efficient to maintain a spreadsheet documenting progress for updating each Dataset Catalog record. This will help to monitor the record update status and readiness for website summary upload (see NCPN Website Data Set Summaries below). Dataset Catalog record reports should be printed and sent to the appropriate park contact for approval and sensitivity check prior to uploading record summaries on the NCPN website.

NCPN Website Data Set Summaries

NCPN is currently placing Dataset Catalog report summaries on the NCPN website at <http://www.nature.nps.gov/im/units/ncpn/DCatSelect.cfm>. The information is compiled by running a query in Dataset Catalog to retrieve a summary of completed records and following the directions in Attachment C for uploading this information to the NCPN website.

A note about this document

The goal of this document is to provide a brief introduction to the dataset catalog, to enable someone to begin entering data, and to provide data standards for records within the Northern Colorado Plateau I&M Network. In the course of using this database please use and read on-line help and FAQs which will contain more comprehensive background information. Keep in mind that the standards and procedures outlined here will change over time as the dataset catalog software and methodology evolves.

Please add to, edit, and correct this document as needed, and send your changes to missy_powell@nps.gov so that other park staff can benefit from your ideas and work. Ideally this guide will improve with use, and develop into a concise desk reference that provides continuity through software upgrades and staff changes.

Last updated by Missy Powell, NCPN I&M Program, 08/31/05

Attachment A. Transcription form for assembling information on a data set**Dataset Catalog Record**

Title:						
Park:						
Contact:						
Is this sensitive data?						
Keywords:						
Abstract:						
Purpose:						
Related Reports/Maps: (include title, author, date, publ info)						
Other Related Data (not main data): (include title, author, type of data, location)						
Dataset Dates:	Begin					
	End					
	Multiple Dates					
	Single Date					
Quality of data set:						
Update Frequency: (Monthly, Annually, etc.)						
Status: (New, Active, Inactive, Historic, etc.)						
Progress: (Planned, In Work, Complete)						
Coverage: (In/Out of Park, State- wide, etc.)						
Study Area Location:						
Format of Data: (Access, Excel, field forms, etc.)						
File Location:						
Online URL:						
Comments:						

Attachment B. Standardized keywords used in Dataset Catalog and NatureBib

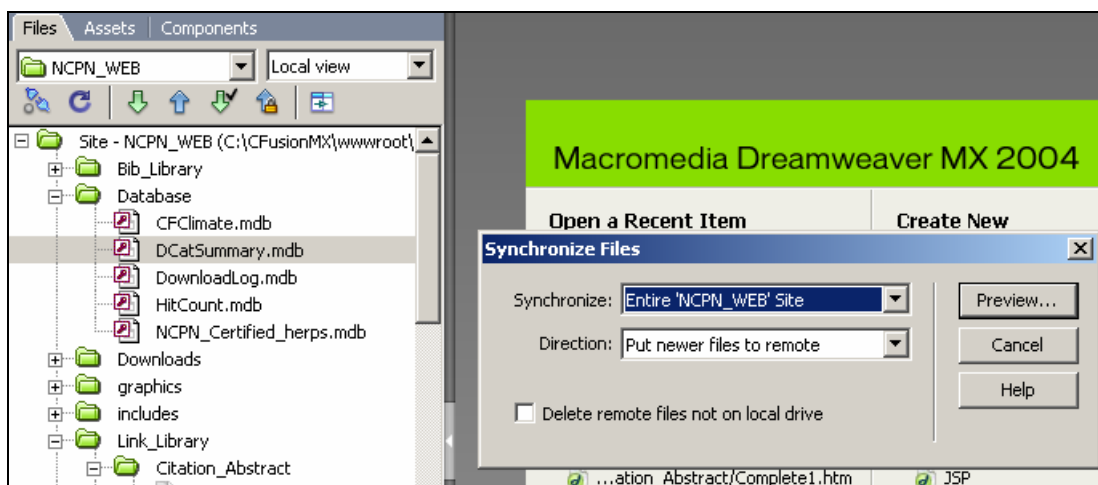
Topic Area	Keywords
Animal Studies	invertebrates
	fish
	reptiles/amphibians
	birds
	mammals
	threatened-endangered-sensitive animals
	exotic/invasive species - animals
Plant Studies	non-vascular plants
	plant communities
	threatened-endangered-sensitive plants
	exotic/invasive species - plants
Physical Sciences	cave (flora/fauna)
	cave (karst)
	erosion-sedimentation
	geology
	geomorphology
	geophysics
	glaciology
	petrology/mineralogy
	sedimentology/stratigraphy
	soil science
	tectonics
	volcanology/geothermal
Aquatic Studies	coastal-marine systems
	flood management/history
	hydrology (general)
	hydrology (surface)
	limnology
	oceanography
	water quality
	water quantity
	water rights
	wetland/riparian

Topic Area	Keywords
Atmospheric Sciences	air quality
	climatology
	night sky/light pollution
	soundscape
Management	management/administration
	visitor impacts
	recreation/aesthetics
	range management
	forestry
	fisheries management
	wildlife management
	watershed management
	integrated pest management
	minerals management
	restoration - natural
	restoration - cultural
Paleontology	
[Other]	database/information systems
	GIS
	agriculture
	fire
	microbiology
	inventory
	monitoring
	archaeology
	ethnology
	history
	sociology
	contaminants/hazardous materials

Attachment C. Instructions for uploading Dataset Catalog record summaries to NCPN Internet website

Instructions for uploading Dataset Catalog record summaries to NCPN Internet website

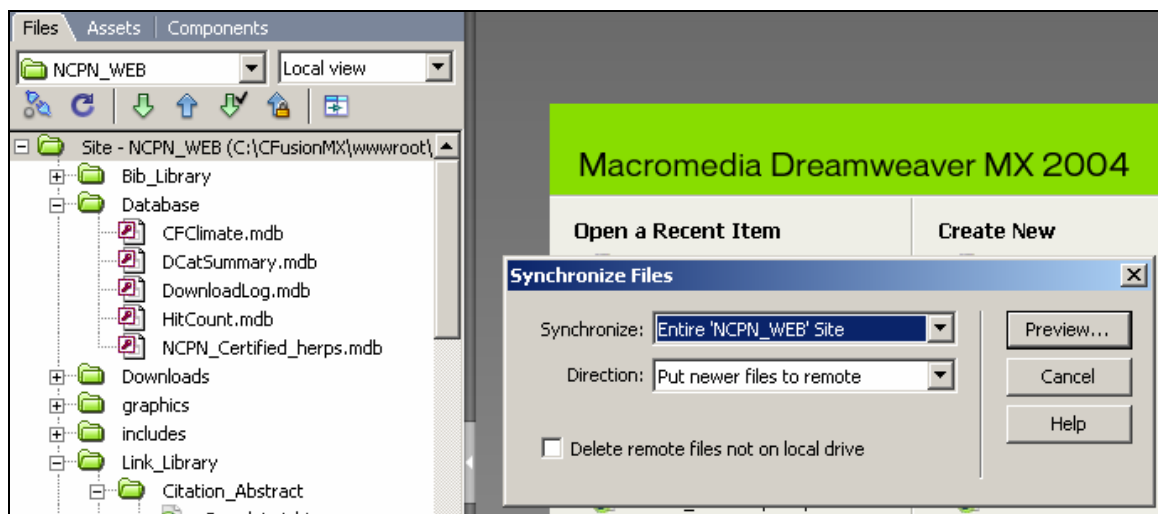
- Open Dreamweaver.
- Right click on Database\DCatSummary.mdb and select Synchronize...
- Synchronize to 'Selected local files only' and 'Get newer files from remote'. Then click on Preview (see below). This will tell you if you have the latest copy at *C:\CFusionMX\wwwroot\NCPN_WEB\Database\DCatSummary.mdb*. If the newest version is not on C, it will ask you if you want to bring down the newest version. Download the newest version if necessary.



- In Dataset Catalog Queries, open 'qry_Web_FINAL' in Design View.
- Update the Criteria for the DCat_IDX field to include **all** completed Dataset Catalog record ID numbers ready for web upload.
- Run table query. This will create the table 'tblzAllRecordsForWeb'.
- Change the date format by copying the date fields to the appropriate fields in *Date conversion for DCat records.xls* (follow instructions in this file).
- Export 'tblzAllRecordsForWeb' to *temp/tblzAllRecordsForWeb.mdb*.
- Open *C:\CFusionMX\wwwroot\NCPN_WEB\Database\DCatSummary.mdb*
- Copy the file (DCatSummary.mdb) to another working location (e.g., C:\temp). Right click on the file to assure it is **not** read-only.
- Right click on the table, Sheet1, and select Linked Table Manager. Select Sheet1 and Always prompt for new location. Click on Ok.
- Open Sheet1.
- (Note – this step will be automated by Russ by the end of Aug 2005.)
 - Sort by DCat_IDX, ParkCode, Title, and Test_MultiDate_Date.
 - Find records that have Multiple Dates per DCat ID.
 - Manually combine the Multiple dates into one record and delete the others. Important – if there are multiple URLs and/or keywords, there must be a MultiDate record for each unique record.

Attachment C. Instructions for uploading Dataset Catalog record summaries to NCPN Internet website

- Close Sheet1.
- Go to Macros and run 'macCreateDCat'. This runs all of the necessary queries to update the database fields.
- Visually check 'tblSummary' for correctness.
- Close database.
- Rename old *DCatSummary.mdb* to *DCatSummaryOLD.mdb* and then copy the new *DCatSummary.mdb* to *C:\CFusionMX\wwwroot\NCPN_WEB\Database*
- Open Local Host copy of NCPN website.
- In Macromedia, right click on "Site – NCPN_WEB" and Synchronize. Choose to synchronize 'Entire 'NCPN_WEB Site' and 'Get new files from remote'. Click on Preview (see below). Answer Yes to all updates *except* 'DCatSummary'.



- After files on the Local Host website are checked and approved, go to Dreamweaver, select *DCatSummary.mdb* and click on the "blue up arrow with the lock" to Check in your file on the Fort Collins server. Done!

Appendix D. NCPN user guidelines for NPSpecies**Background**

The NPSpecies database was developed by the National Park Service Inventory and Monitoring Program to store, manage and disseminate scientific information on the biodiversity of organisms in National Park Service units throughout the United States and its territories. The database can list all species that are entered for each park unit, and list all park units for which a particular species has been recorded. Additionally, NPSpecies documents supporting evidence for a species record, which can include references, vouchers and observations.

NPSpecies has two major application components: a master, centralized, Internet-based application developed in Oracle, and a local, PC-based application developed in Microsoft Access. The Internet-based component of NPSpecies was designed to be the central repository for the most current species data. Any data derived from this central source, such as a report or a data download, has the potential to be out of date at any time after it was acquired. The local PC-based application is used primarily as an interim data entry, update, or query tool; data, and changes made to them are then uploaded to the Internet-based version.

Depending on the NCPN park and species group, NPSpecies has been populated from a variety of sources, including reports, unpublished species lists, results of focused inventories, and individual expertise. At the present time (September, 2005), not all of the information in the database is up-to-date, and inaccuracies are inevitable. The ultimate goal, in 2006, is a certified list that includes high-quality references, vouchers, and observations which substantiate each species record that has a Park Status designation of Present in Park.

The purpose of this document is to clarify ambiguities that can arise when entering data, and to state the preferred data entry methodologies used by the Northern Colorado Plateau Network. For general data entry instructions, refer to the training material found at <http://science.nature.nps.gov/im/apps/npspp/Documents.htm>.

Basic Navigation

Step 1 – Download the desktop application

To download the most current desktop version of the NPSpecies database, go to the Inventory and Monitoring Program webpage at <http://science.nature.nps.gov/im/apps/npspp/Discover.htm>. Select the Desktop Application hotlink to download the Application/User-Interface. This is the graphical interface or the front end file, which is used to enter data and generate reports. The current application is version 2.2 in Access XP (2002). A complete NPSpecies program consists of the front end file and four additional files:

1. Working Data File – also called a back end file (e.g., ARCH_DATA.mdb), these are individual park files, usually already populated with data by a user, or downloaded from the online NPSpecies application,

2. Standard Taxonomic Classification data – a Master Data file (Std_master.mdb) which contains scientific names, common names, and taxonomic relationships,

3. Park data – a Master Data file (Parks_master.mdb) which contains park codes and associated information,

4. T&E data – a Match Data file which contains federal, state and global rank listing status. When changes and/or updates are made to any of these files, an email notification will be sent from the WASO office alerting users to download the most current version(s). (Not up-to-date as of September 2004).

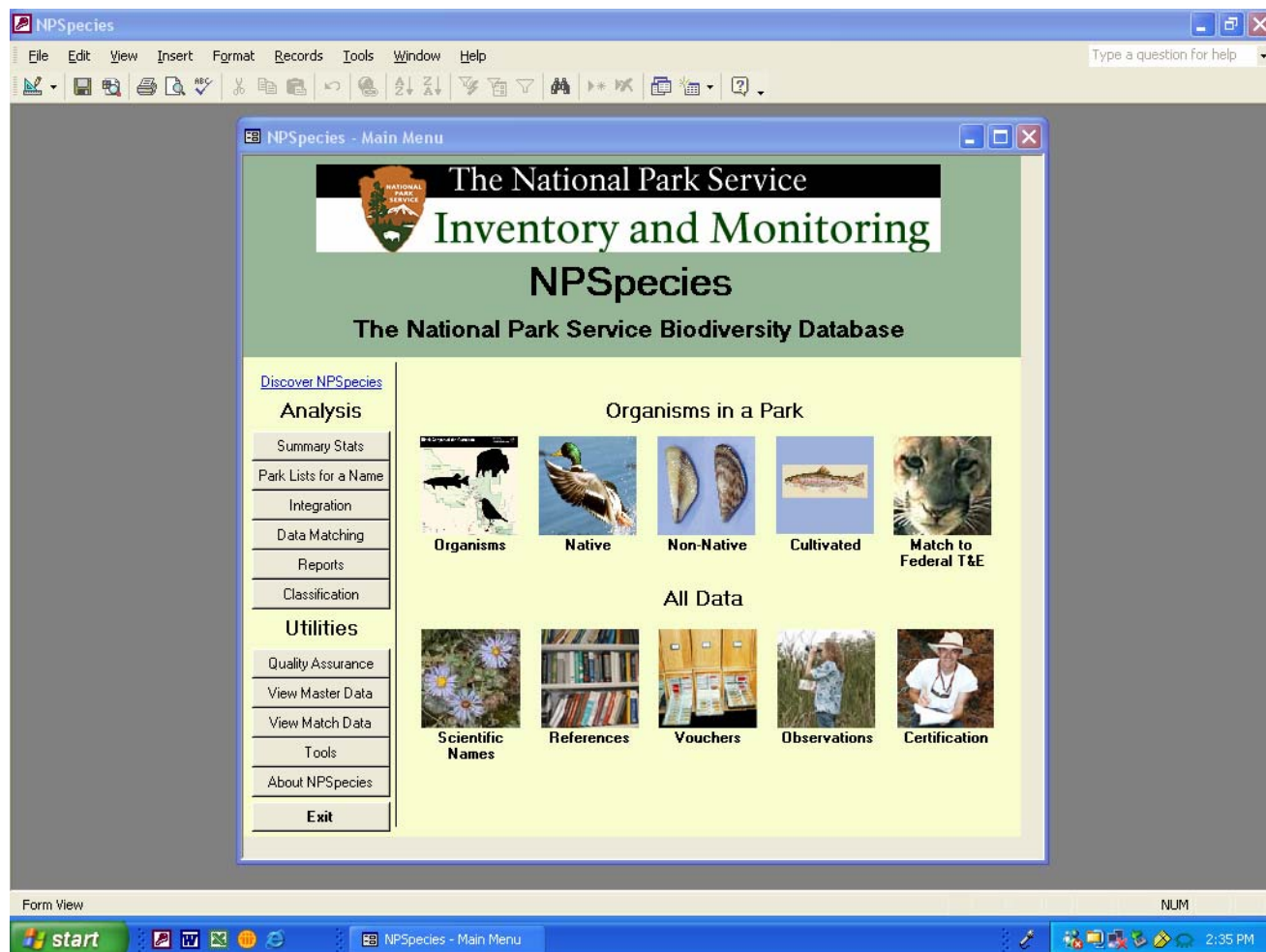
Step 2 – Download park data

To download park data, go to <https://science1.nature.nps.gov/npspecies/>. You will need a login and password issued from the network data manager which will enable you to access and/or make changes to records in the database. Under the Utilities section, select Download Data, and proceed with downloading and saving individual park data files. The NCPN downloads these park data files at the beginning of each quarter, or as necessary after major online database updates. See the Archive section for storage information.

Step 3 – Select and link to the park you want to work with

At the user interface, select the Tools, Linking path to navigate to the directory which holds your working data files. Highlight the working data file for the park you want to work with and press the Link Files button. You are now ready to enter or modify existing data.

NCPN Data Standards and Protocols



I. Adding a new species to the database

Check the ITIS website (<http://www.itis.usda.gov/>) first to see if there is a Taxonomic Serial Number (TSN) for the species you want to add to the database. If there is a TSN number, proceed with creating a Park-Name profile, if not, enter the name exactly as it appears in the source material and proceed with the Add Scientific Name pathway. You must add the full scientific name, kingdom, category and rank to create a Park-Name profile – if unsure about the order and family, select “Unassigned” from the pick list.

II. NCPN Data Standards for Synonyms and Historic Names

Many of the data sources for NPSpecies are legacy data that has been previously collected. Latin names may vary in the source data as a result of changing taxonomy. For example, a report from the 1950's containing a species list of amphibians, might list the tiger salamander as *Ambystoma tigrinum*. Another report from the 1970's might list the tiger salamander by a subspecies name, *Ambystoma tigrinum nebulosum*. A third report from 2002 may list this amphibian by yet a third name, *Ambystoma tigrinum utahense*. All three of these names are "correct" names, and should have corresponding Park-Name profiles entered, so that all three references can be linked to the preferred Local List name at Certification.

The Standard Scientific name you select when entering an NPSpecies record should always be the name as it appears in the source material. This means you may need to add new species records and use a temporary TSN. Reconciliation of the variations will take place at certification. The only exception to this is when a species name is obviously misspelled. In these instances you should select the correct species name from the taxonomic module.

III. Certification

The process of certification is a quality assurance (QA) and quality control (QC) procedure for species checklists performed in cooperation with state and local authorities that are most familiar with each taxonomic class. The information that results from the certification process is based upon the premise that the information is current, complete and accurate to the best knowledge of the reviewers at the time of the review. Because NPSpecies is a dynamic database which will continue to be populated into the future, it is necessary to document when, and which data have been reviewed for completeness and accuracy so that users can qualify the use of the data for scientific, management and interpretive purposes.

In order to maintain information in such a dynamic system, data need to be entered and reviewed on an intermittent or periodic basis. At minimum, a certification should be completed after the first formal review of a species checklist for a park and a taxa category. The need for subsequent reviews and certification will vary from a few to many years depending on changes to park boundaries, man-made or natural events affecting biodiversity, and the extent of data added or edited after the time of the previous review.

Upon completion of the QA process, the participants will fill out a form documenting what was reviewed, when the review took place and who participated. The information on the form will be included in the on-line version of NPSpecies as a permanent part of the database. Once completed, users and managers of information in NPSpecies will know at any time the history of reviews and can gauge the appropriate use of the information.

See <http://science.nature.nps.gov/im/apps/npspp/QA.htm> for detailed information on the certification process.

IV. NCPN Park-Name Profile standards

A Park-Name profile is the record holder for information on an individual species in a park that, together with other species, comprise a species list for a park. When populating a Park-Name profile, ensure that the source information is valid and correct before adding it to the database.

Park-Name Profile

PARK-NAME PROFILE

Delete Default Values Online ITIS Cancel Save Close

TSN: 173491

Kingdom: Animalia **Author:** Baird and Girard, 1852

Category: Amphibian **Hybrid Author:** Baird and Girard, 1852

Order: Anura **Parent Sci. Name:** Bufo

Family: Bufonidae **Std. Accepted Sci. Name:** Bufo punctatus

Local Classification

Local List: ☒

Local List Details:

Local Accepted Sci. Name: Bufo punctatus

Local Accepted TSN: 173491

Preferred Local Names

Scientific:

Common: red-spotted toad

Std. Common Names

red-spotted toad

Sapo manchas rojas

Checklist Information

	Data Source	Details	Zoom
Park Status	Present in Park	Platenberg and Graham 2003, Bibl	+
Abundance	Common	Platenberg and Graham 2003, Bibl	+
Residency	Breeder	Platenberg and Graham 2003, Bibl	+
Nativity	Native	Platenberg and Graham 2003, Bibl	+
Cultivation	NA		+

Management Information

☐ Weedy Plant?

☐ Part?

Record: 1 of 1 (Filtered)

A. Preferred Local Names

1. Scientific Name

This field was the precursor to the Local Accepted Scientific name and should be left blank. The data is now captured in the Local Classification fields, and is the equivalent to the Standard Scientific name in the Park-Name profile.

2. Common Name

After a taxonomic category is certified, the Common Name field will contain the name that an individual park calls a particular plant or animal. Ideally, this name will be standardized across the NCPN. Whether to capitalize a common name or not, will follow the guidelines provided by the certifier, e.g., bird names follow AOU guidelines as in American Crow, herpetological common names are all lower case except when proper nouns are used, e.g. Woodhouse's toad.

B. Checklist Information

1. Park Status

Select the Park Status that corresponds to the information you have in the source material. The tables below contain the possible values, followed by the standard NPS I&M definitions and comments and the data standards developed by the NCPN.

Park Status	NPS I&M Definition	NPS I&M Comments
Present in Park	A species occurrence in the park is documented and assumed to be extant.	There is extremely high confidence that the species is currently in the park. A current, verifiable reference, voucher or observation is included in NPSpecies.
For NCPN parks		
High quality evidence, collected inside of park boundaries, is required for a species to be designated as Present in Park.		
If the source material is a report, the author should be recognized as knowledgeable about the park's biota or species group, and confirmation of species observations or collections should be made in the report.		
A species list is typically not strong enough evidence to substantiate a Present in Park status and is not a preferred source. Two exceptions are:		
<ul style="list-style-type: none"> • If the species list is annotated with specifics relating to observations made by the author; • If the species list is accompanied by confirmation or annotation by the author that he/ she has personally observed the species and the list is not hypothetical. This situation may occur if a park biologist has compiled a list based on on-the-ground knowledge of species presence. 		
In both of these exceptions the goal is to replace Present in Park records that are based on a species list, with a definitive reference or voucher. These exceptions also assume that the species list has a publication date, and that the author is recognized as an authority on the park's biota or species group.		
If the source is a voucher, we have to assume the identification is correct; however, if the voucher represents a species that is out-of-range, difficult to identify, or otherwise could be called into question, further verification should take place.		
If the source is an observation, it should be made by a biologist or other scientific expert who is recognized by their peers as having taxonomic expertise for the species in question. Associated information on location and date is needed to complete an observation record.		

Park Status	NPS I&M Definition	NPS I&M Comments
Probably Present	The park is within the species' range and contains appropriate habitat. Documented occurrences of the species in the adjoining region of the park give reason to suspect that it probably occurs within the park. The degree of probability may vary within this category, including species that range from common to rare.	Very high confidence that the organism is currently in the park. Verifiable evidence may exist in NPSpecies, but is not considered current enough to elevate the status to Present in Park. Efforts should be made to obtain current, verifiable evidence in NPSpecies to elevate the Park Status to Present in Park. If reasonable efforts to obtain current, verifiable evidence are unsuccessful, then the Park Status should be changed to Unconfirmed, Historic, Encroaching or False Report as applicable.
For NCPN parks		
Use this category for those species that have been reported for a park, but for which evidence has not yet been located, obtained, or entered into NPSpecies. Use Probably Present for species listed as Present or Probably Present on a species list, if no associated confirmation of specific observations accompanies the list. If the species is non-native and invasive, use Encroaching (below) instead of Probably Present.		

Park Status	NPS I&M Definition	NPS I&M Comments
Unconfirmed	Included for the park based on weak (unconfirmed record) or no evidence, giving minimal indication of the species' occurrence in the park.	Any confidence from very low to high that the organism is currently in the park. Verifiable evidence may exist in NPSpecies, but it is not considered sufficient enough to elevate the status to Probably Present, nor current enough to elevate the status to Present in Park. Efforts should be made to obtain current, verifiable evidence in NPSpecies to elevate the Park Status to Present in Park. If reasonable efforts to obtain current, verifiable evidence are

Park Status	NPS I&M Definition	NPS I&M Comments
		unsuccessful, then the Park Status should be changed to Historic, Encroaching or False Report as applicable.
For NCPN parks		
Use this category as a means of maintaining a "watch list," that is, species that could possibly occur in the park, and that should not, at this point, be totally removed or absent from the park's species list. A designation of Unconfirmed implies that there is no evidence that a species was ever in the park.		

Park Status	NPS I&M Definition	NPS I&M Comments
Encroaching	The species is not documented in the park, but is documented as being adjacent to the park and has potential to occur in the park	Extremely low confidence that the organism is currently in the park, but extremely high confidence that the organism is currently adjacent to the park. Verifiable evidence may exist in NPSpecies documenting the occurrence in the park, but it is not current. Potential invasive organisms are good candidates for this Park Status designation, either before they enter a park or after they have been eliminated from a park.
For NCPN parks		
Use this category for non-native, invasive species (e.g., bullfrog, tamarisk).		

Park Status	NPS I&M Definition	NPS I&M Comments
Historic	Species' historical occurrence in the park is documented, but recent investigations indicate that the species is now probably absent.	Extremely low confidence that the organism is currently in the park. Verifiable evidence exists in NPSpecies, but is not current. Extinct, extirpated or eliminated species are candidates for a Historic Park Status designation.
For NCPN parks		
Where there is documentation that a now-extirpated species actually existed at one time within park boundaries, the Historic designation is appropriate. In general, if 50 years has passed since the last time that a species was collected or observed, use the Historic designation. Avoid 'padding' species lists with animals whose historic <i>ranges</i> may have included a park.		

Park Status	NPS I&M Definition	NPS I&M Comments
False Report	Species previously reported to occur within the park, but current evidence indicates that the report was based on a misidentification, a taxonomic concept no longer accepted, or some other similar problem of interpretation.	Extremely low confidence that the organism is currently in the park. Evidence exists in NPSpecies, but it cannot be sufficiently verified.
For NCPN parks		
Use this designation primarily to correct a record that has already been entered into NPSpecies. It is not necessary to enter a new record into NPSpecies that is recognized as being incorrect or misidentified.		
A False Report designation for plant species could occur in the following way. Welsh, 1965 submitted a species list for the plants in ZION that is recognized as a benchmark list in the botanical literature. It is discovered that he included a plant which he thought <i>could</i> be living inside park boundaries, but it has now been verified that it has never been present. This species can get a False Report designation, with a corresponding comment in the Details section.		

Park Status	NPS I&M Definition	NPS I&M Comments
N/A	Not Applicable - Park-Status does not apply to the scientific name for the park.	<p>The NA value prevents null values from appearing in NPSpecies and applies to 2 primary situations:</p> <p>1) An outdated scientific name that is not used in the locale of the park for an organism, but is in NPSpecies for a park because of the inclusion of vouchers, observations or references that use the name. Note that outdated names are reconciled in NPSpecies with the Local Classification system.</p> <p>2) Vouchers, observations or references that use the name have not been identified at the species level or lower, but are included in NPSpecies with the name of a higher taxonomic rank than the species level. The names of these higher level</p>

Park Status	NPS I&M Definition	NPS I&M Comments
		taxonomic ranks will disappear from NPSpecies if the evidence of the respective name are identified to the species level or lower, and are changed appropriately in NPSpecies.

Species with a Park Status designation of Present in Park must have a data entry in the four remaining Checklist information fields; Abundance, Residency, Nativity and Cultivation. Those species with a designation of Probably Present are not required to have a data entry for Abundance, Residency and Cultivation; if there are data in these fields, they will be automatically replaced with a value of N/A during the certification process. A Nativity determination can be entered for Probably Present species, which will not be replaced at certification. For the remaining Park Status designations Unconfirmed, Encroaching, Historic, False Report and N/A, no other data entries are required for the remaining checklist fields.

2. Park Status Data Source

The data source for the park status designation is meant to show under whose authority the Park Status was assigned. The source is typically a report or other document that has been entered into NatureBib and has a corresponding Bibkey ID number. In some cases, an ANCS+ voucher will be the only supporting evidence for a Present in Park designation.

NCPN example data entry format(s):

- Bogan et al. 2003, Bibkey #123456
- CANY ANCS+ voucher

3. Park Status Details

This field allows for comments or clarifications to the Park Status designation. As a general rule concerning all Details entries, any time a change is made to the designation in a Checklist field (Status, Abundance, Residency, and Nativity); enter what the designation changed from, the date the change was made, and any information that supports the change.

NCPN example:

In 2001, the black-billed magpie, *Pica pica*, was initially entered as Probably Present to a park's species list based on an inventory or other reliable report. In the Park Status Data Source field, enter:

- Smith 1998, #123456

This is the basis for the Probably Present determination. The following year, a study by Miller on Corvids reveals that *Pica pica* has been confirmed to be present in the park. Change the Park Status checklist field to Present in Park. The Park Status Details field should now read:

- Changed from Probably Present per Smith1998, #123456, to Present in Park per Miller 2002, #566548

These Status Detail fields may seem onerous at first; however, after the initial population of NPSpecies, status changes should become far less frequent. Knowing the basis for status designations or changes is an important piece of documentation for each record.

4. Abundance

Abundance is the current abundance of each organism in each park. This is applicable only to organisms with the Local List checkbox checked and a Park Status of Present in Park. For vertebrates, the values attempt to balance abundance with suitable habitat, and temporal/behavioral considerations. In practice, the entered value should apply (although there are numerous exceptions) to the abundance in the most suitable habitat of the organism, and at the time that the organism is engaged in its principle behavior in (e.g. breeding, migrating, hibernating, etc.), or most important behavior to, the park. A future generation of NPSpecies will address the coding of Abundance (and associated Residency) to separate out the temporal and behavioral aspects. The table below contains the possible values, followed by the standard NPSpecies definitions and comments.

Abundance	Animals	Plants
Abundant	May be seen daily, in suitable habitat and season, and counted in relatively large numbers.	Large number of individuals; wide ecological amplitude or occurring in habitats covering a large portion of the park.
Common	May be seen daily, in suitable habitat and season, but not in large numbers.	Large numbers of individuals predictable occurring in commonly encountered habitats but not those covering a large portion of the park.
Uncommon	Likely to be seen monthly in appropriate season/ habitat. May be locally common.	Few to moderate numbers of individuals; occurring either sporadically in commonly encountered habitats or in uncommon habitats.
Rare	Present, but usually seen only a few times each year.	Few individuals usually restricted to small areas of rare habitat.
Occasional	Occurs in the park at least once every few years, but not necessarily every year.	N/A
Unknown	Abundance unknown.	Abundance unknown.
N/A	Not Applicable – Abundance does not apply to the scientific name in the park.	Not Applicable – Abundance does not apply to the scientific name in the park.

For NCPN parks:

Abundance can be a tricky value to assign, for example, a plant which is endemic to ZION would be considered to be extremely rare in a national context; however, the population is abundant and thriving in the park in its local habitat. Examples like this need to be addressed on a case by case basis, usually in consultation with a park authority for the species. In the above example, it would be appropriate to assign the species an Abundance of Uncommon, and document in the Details section that the plant can be commonly encountered in its rare habitat.

Abundance values should only be assigned by a qualified field researcher who has conducted a current study in the park and understands the range of variability of the population in question. A value of Unknown is a reasonable entry until population studies can be conducted.

5. Abundance Data Source

The data source for the abundance designation is meant to show under whose authority the abundance was given. The source is typically a report or other document that has been entered into NatureBib and has a corresponding Bibkey ID number.

NCPN example data entry format:

- Bogan et al. 2003, Bibkey #598761

6. Abundance Details

This field allows for comments or clarifications to the Abundance designation. As a general rule concerning all Details entries, any time a change is made to the designation in a Checklist field (Status, Abundance, Residency, and Nativity), enter what the designation changed from, the date the change was made, and any information that supports the change.

NCPN example data entry format:

- Changed from Abundant per Schelz and Moran, 2000, to Common per Platenberg and Graham 2003, #549677

7. Residency

Enter the current residency classification for each animal species in each park. This field is applicable only to animals with the Local List checkbox checked and a Park Status of Present in Park. The values attempt to balance temporal and behavioral considerations. In practice, the entered value should apply (although there are numerous exceptions) to the residency of the organism at the time that the organism is engaged in its principle behavior (e.g. breeding, migrating, hibernating, etc.) in, or most important behavior to, the park. A future generation of NPSpecies will address the coding of Residency (and associated Abundance) to separate out the temporal and behavioral aspects.

The current designations for Residency are Breeder, Resident, Migratory, Vagrant and Unknown. However, because of large differences in behavior, mobility and habitat requirements, it can be difficult to assign the same set of residency values across each category of vertebrate animals, and have them mean the same thing. Evidence of breeding in bird taxa will not be the same as evidence for mammal taxa. Even within a category of vertebrates, residency criteria can differ. For example, residency criteria are similar for most endemic desert fish species, though there are some migratory fishes like the endangered Colorado pikeminnow, that are resident in the rivers of some parks, but do not spawn there. Therefore, different fish species can have different residency criteria, as can large carnivores, most birds and other highly mobile animals.

The NCPN is developing guidelines for each category of vertebrate animals using the standard NPSpecies designations. From the source material, select the Residency category that best describes the status of a particular species, and list any supporting details in the Details section.

A. Birds

Residency	NPSpecies Definition	NCPN Guidelines - Birds
Breeder	Population reproduces in the park.	The following criteria apply as evidence of confirmed breeding, also known as direct evidence of breeding: <ul style="list-style-type: none"> • adults feeding fledglings • fledglings found • adults feeding young • nest building • nest with eggs • nest with young • used nest
Resident	A species that is suspected to breed in the park, or for which circumstantial evidence of breeding exists, is categorized as a Resident until confirming evidence is provided. If breeding is expected, enter 'probable breeder' in the Residency Details field. If a species is a winter resident, enter 'winter resident' in the Residency Details field.	The following criteria apply as evidence of indirect or circumstantial evidence of breeding: <ul style="list-style-type: none"> • species found in suitable breeding habitat during its breeding season, • multiple singing males found in suitable breeding habitat during their breeding season, • pair found in suitable breeding habitat during their breeding season. • courtship behavior, territory defense, copulation
Migratory	Migratory species that occur in the parks approximately two months or less each year, and does not breed there.	
Vagrant	Park is outside of the species' usual range.	
Unknown	Residency status in park is unknown.	
NCPN Examples		
<p>1. From a recent inventory, a contractor submits the following comment, "probable breeder - park is within species breeding range and has appropriate habitat." This species would receive a designation of Resident until proof can be obtained that it is breeding in the park. A comment in the associated Details section would read, per Johnson, 2003, species is a probable breeder – the park is within species breeding range and has appropriate habitat. Awaiting direct evidence of breeding.</p> <p>2. A contractor submits a species list which lists certain species as Breeders. The direct evidence for the determination is embedded in the final report. Refer to the final report in the Data Source field, for example, Johnson et al. 2003, Bibkey #549677 – the report serves to substantiate the Residency determination.</p>		

B. Herpetofauna

Residency	NPSpecies Definition	NCPN Definition - Herpetofauna
Breeder	Population reproduces in the park.	The NCPN had determined that amphibians and reptiles living within park boundaries are breeding, therefore all Present in Park species have a residency of Breeder.

Residency	NPSpecies Definition	NCPN Definition - Herpetofauna
		Individual cases do exist, and are noted for each park where they occur.
Resident	A species that is suspected to breed in the park, or for which circumstantial evidence of breeding exists, is categorized as a Resident until confirming evidence is provided	
Migratory	Migratory species that occur in the parks approximately two months or less each year, and does not breed there.	N/A
Vagrant	Park is outside of the species' usual range.	
Unknown	Residency status in park is unknown.	

C. Fish

Residency	NPSpecies Definition	NCPN Definition - Fish
Breeder	Population reproduces in the park.	The following criteria apply as evidence of confirmed breeding, also known as direct evidence of breeding: <ul style="list-style-type: none"> larval fish vouchers
Resident	A species that is suspected to breed in the park, or for which circumstantial evidence of breeding exists, is categorized as a Resident until confirming evidence is provided. If breeding is expected, enter 'probable breeder' in the Residency Details field.	When larval fish have not been collected or observed in park waters, fish species will receive a designation of Resident, until direct evidence can be found.
Migratory	Migratory species that occur in the parks approximately two months or less each year, and does not breed there.	There are some migratory fishes that are resident in the rivers of some parks, but do now spawn there, although their progeny can end up back inside of park boundaries. Note information by species.
Vagrant	Park is outside of the species' usual range.	
Unknown	Residency status in park is unknown.	

D. Mammals

Residency	NPSpecies Definition	NCPN Definition - Mammals
Breeder	Population reproduces in the park.	The following criteria apply as evidence of confirmed breeding, also known as direct evidence of breeding: <p>Reproductive status checked for:</p>

Residency	NPSpecies Definition	NCPN Definition - Mammals
		<ul style="list-style-type: none"> • Lactating/non-lactating • Scrotal/non-scrotal • Pregnant • Post-lactating
Resident	A species that is suspected to breed in the park, or for which circumstantial evidence of breeding exists, is categorized as a Resident until confirming evidence is provided. If breeding is expected, enter 'probable breeder' in the Residency Details field. If a species is a winter resident, enter 'winter resident' in the Residency Details field.	<p>The following criteria apply as evidence of indirect or circumstantial evidence of breeding:</p> <ul style="list-style-type: none"> • Is the species a juvenile? • Is the species a sub-adult?
Migratory	Migratory species that occur in the parks approximately two months or less each year, and does not breed there.	N/A
Vagrant	Park is outside of the species' usual range.	
Unknown	Residency status in park is unknown.	

8. Residency Data Source

The data source for the residency designation is meant to show under whose authority the residency was given. The source is typically a report or other document that has been entered into NatureBib and has a corresponding Bibkey ID number.

9. Residency Details

This field allows for comments or clarifications to the Residency designation. As a general rule concerning all Details entries, any time a change is made to the designation in a Checklist field (Status, Abundance, Residency, and Nativity); enter what the designation changed from, the date the change was made, and any information that supports the change. See Park Status Details for an example.

10. Nativity

Nativity is a "birth" classification for each species in each park. Park Status as defined above must be either Present in Park or Probably Present, and applicable only to organisms with the Local List checkbox checked. If the park status of an organism is not Present in Park, then the Nativity designation represents the nativity if the organism were eventually confirmed in the park.

Residency	NPS I&M Definition	NPS I&M Comments
Native	The organism is native, or would be native, to the park (either endemic or indigenous) if it were eventually confirmed in the park.	
Non-native	The organism is not native, or	Cultivated organisms as defined

Residency	NPS I&M Definition	NPS I&M Comments
	would not be native, to the park (neither endemic nor indigenous)	under the Cultivation field are also considered non-native.
Unknown	Nativity is unknown relative to the park.	
N/A	Not Applicable	Applies to names that do not represent organism names for the locale of the park.

11. Cultivation

Cultivation is a classification designation for each non-native organism in each park. It is applicable only to organisms with the Local List checkbox checked, a Park Status of Present in Park or Probably Present, and a Nativity of Non-Native. Cultivation is intended to distinguish between non-native organisms that were introduced as part of a park's mission, and non-native organisms that occur in the park naturally. Cultivation was not intended to apply to organisms that are cultivated for landscape purposes and have not persisted into the natural environment, for example plants in gardens or terrariums, or animals in enclosures. In general, NPSpecies was not intended to include controlled, "domestic" organisms.

Cultivation	NPS I&M Definition	NPS I&M Comments
Cultivated	A non-native species that is currently cultivated in the park.	
Persistent	A non-native species that persists in the park (either reproducing or non-reproducing) from a previous cultivation in the park.	
Not Cultivated	A non-native species that is not currently cultivated in the park.	
Unknown	A non-native species for which the cultivation in the park is currently unknown.	
N/A	Not Applicable – Cultivation does not apply to the non-native scientific name in the park.	All names on a park's list that do not have a Park Status of Present in Park or Probably Present and a Nativity of Non-native should have a Cultivation of NA.

C. Management Information

The NCPN is in the process of standardizing the criteria used for assigning management designations to ensure that they are consistent and defensible for network parks.

1. Weedy Plant

This is a checkbox field for plant species only. Plant species are considered "weedy" or "invasive" if they (a) occur almost exclusively in disturbed habitats, (b) relatively recently occupied natural

habitats in competition with native species, or (c) occur across a broad range of ecological conditions. The definition of Weedy Plant has been found to be too general to be of use from both an ecological and managerial perspective. The Pest field was added to provide a narrower definition that was specifically oriented to management. No similarly narrow counterpart to the ecological aspects of the definition of Weedy Plant is currently in NPSpecies.

2. Pest

This is a checkbox field for when a species is considered to be a “pest” in the park. “Pests are living organisms that interfere with the purposes or management objectives of a specific site within a park, or that jeopardize human health and safety.” (NPS Management Policies 2001, Section 4.4.5.1). Organisms identified by a park’s Chief of Natural Resources or Invasive Species Management Team, or addressed in a park’s Resource Management Plan or APCAM database are good candidates for having Pest checked in NPSpecies.

3. Management Priority

Select this checkbox field when a species is a management priority in the park. Organisms identified by the park’s chief of Natural Resources or addressed in a park’s Resource Management Plan are good candidates for having Management Priority checked in NPSpecies.

For NCPN parks:

The following table contains the designations to be used for listed species. For NCPN parks, the order of priority for these designations is USFWS designations followed by state designations, and then individual NCPN park designations. For individual park determinations, park resource management staff will help in determining if a species warrants a high-visibility or public interest designation. For all designations, click the checkbox to indicate the species is of management priority, and put the designation in the corresponding Details section together with further clarification if necessary.

Agency Listings	NCPN Data Entry
U.S. Fish and Wildlife Service	FWS=E (Endangered) FWS=T (Threatened) FWS=C (Candidate taxon, ready for proposal) FWS=AD (Proposed delisting) FWS=DM (Delisted taxon, recovered, being monitored first five years) FWS=XN (Experimental population, non-essential)
State Natural Heritage Programs	UT NHP=SS (Sensitive species; Species of special concern) CNHP=SC (Species of concern)
NCPN parks	BRCA=MC (Management concern) High-visibility or public interest. FOBU=MC (Management concern) High visibility or public interest.

4. Exploitation Concern

Select this checkbox field when a species is an exploitation concern in the park. Organisms identified by a park's law enforcers or contained within the Critical Incident Report System database are good candidates for having the Exploitation Concern checked in NPSpecies.

For NCPN parks:

Select the checkbox if the species is vulnerable to specific disturbance or collection pressure. This will usually be determined at certification. Exploitation can be due to rarity and/or commercial value (certain cacti and reptiles), poaching, ecotourism, or other sources. Provide a description of the exploitation concern in the corresponding Details field.

D. Record Information**1. Data Source**

The principle source of a value entered in a single field, multiple fields or an entire record as applicable.

For NCPN parks:

NCPN's definition for this field diverges from the WASO definition. Use this field to document the original source used when the species is first added to a park (example: Smith and Jones 2003, Bibkey #548221). Once an entry has been made in this field, it should not change, but serve to show how the record was originally entered into the database.

2. Comments

This field is used for additional information pertinent to the values entered in an entire record if clarification or elaboration is desired.

3. Created By

The name of the person who created the new record, or for reference links, the name of the person that created the first link between a reference and a species.

For NCPN parks:

Enter your first initial and last name, followed by your park or program affiliation. If you are editing a record previously created or edited by someone else, append your information to the existing information.

- E. Nance, NCPN I&M
- K. Cahill, BRCA

V. NCPN Voucher Profile standards

Background

A major goal of NPSpecies is to have credible, high-quality substantiation for every species in a park list with a status of Present in Park. Evidence records, whether vouchers, references or observations, are an integral part of the NPSpecies database and can serve as invaluable tools to Resource Managers to aid in managing park resources. The WASO office has determined that individual networks can define the scope and use of the NPSpecies database, and as such, the NCPN has determined that, for the database to be truly effective in helping resource managers, it should be as all-inclusive as possible. Towards that end, the NCPN will document *all* vouchers, references or observations that are found through data mining efforts and which support the presence of a species in a network park. This is of particular value when considering the turnover of park personnel, and, in the case of references, the often large amounts of gray literature that are generated from park programs, year after year. When these references are entered into NatureBib, linked to NPSpecies and available for review on a data store, a Resource Manager should be able to quickly access the full institutional knowledge for a particular species.

Vouchers constitute the highest level of evidence because others can go back and examine the specimen if it has been properly repositied. A voucher is an observation record in which physical evidence of the organism is also collected, cataloged and archived along with the permanent cataloging of event and location information. Voucher sources include park collections managed in the NPS ANCS+ database, results from I&M focused inventories, and information from repositories across the country that may house specimens collected from parks.

A voucher herbarium specimen is a pressed plant sample deposited for future reference. Since plant classification is constantly changing with shifts in species alignments and groupings as new evidence comes to light, plant identifications are also subject to change. Vouchers specimens help with cross-referencing these changes to previous identification efforts.

Voucher specimens for animals are often not practical, especially for TES species, rare species, species of management concern and/or large animals. Likewise, storage and curatorial requirements for vertebrate species are usually beyond the scope of most park museums. In these cases, photo vouchers or audio recordings, (e.g. for bats), can be used instead.

A. Park-Specific Information

1. From Park?

This is a pull down pick-list with the values Yes, No, and Unknown, used to determine if the voucher was collected inside park boundaries.

For NCPN parks:

This value will always be Yes, or Unknown. Any vouchers collected outside of park boundaries will not be included in the database. A value of Unknown is a place-holder value, until a Yes (or No) determination can be made.

2. Sensitivity Level

This is the security level based on the sensitivity of the particular voucher or observation record.

Sensitivity Level	NPS I&M Definition
Public	No access restrictions
NPS Only	Restricted to National Park Service staff
Park Only	Restricted to park staff specified in Park Code
For NCPN parks	
Currently, the default value is set for NPS Only. Look for upcoming guidance on changes to this designation.	

B. Specimen Identification Information

1. Steward/Repository

This field contains the acronym, name and address of herbarium, museum, collection or other location where voucher specimen is stored.

NCPN example data entry format(s):

- SEUG Herbarium Cab NABR—Asteraceae
- Zion Museum, Collections C1, D7
- CARE Bird & Mammal Cab Rodents-1
- Museum of Southwestern Biology, Albuquerque, NM

2. Specimen ID

This is an identification number for voucher specimens usually provided by the repository, as contrasted with the collector number provided by the collector.

For NCPN parks:

This number is primarily associated with an ANCS+ record, and will contain an Accession number and a Catalog number. A standard NPS accession number includes a 4-letter park acronym, a hyphen, plus a number of up to 5 digits, front padded with zeros and spaced so the last digit is in the 10th character space. A standard NPS catalog number includes a 4-letter park acronym, plus a unique number of up to 7 digits, front padded with spaces so that the last digit is in the 12th character place.

NCPN example data entry format:

- Accession # HOVE-00500, Catalog # HOVE 1162

The purpose of this somewhat onerous format is to ensure that the data from collection materials resulting from I&M field work are compatible with the special formatting required from the NPS ANCS+ cataloging system. Failure to use the proper formatting can cause a data upload into ANCS+ to fail, and create additional cleanup work for park curators.

C. Event Information

1. Doc. Sci. Name

Scientific name that was documented when the species was collected (the name on the original label for vouchers).

For NCPN parks:

The documented scientific name is the name on the original voucher label, usually containing the embedded authorities. Enter this name exactly as it appears in the source material.

NCPN example data entry format(s):

- *Chrysothamnus nauseosus* (Pall.) Britt. var. *gnaphaloides* (Greene) Hall
- *Thermopsis montana* Nutt. ex T. & G.
- *Neotoma* cf. *Neotoma cinerea*

2. Date

This is the date that the voucher was collected or the beginning date of a date-range if the exact date is unknown.

For NCPN parks:

The date format is mm/dd/yyyy. Often, the source material will contain an entry such as Apr 1976. Enter the date, 04/01/1976, and in the Comments section, enter:

- Collection date accurate to month and year only.

When the collection year is the only data supplied, enter 01/01/1976 and note in the Comments section:

- Collection date accurate to year only.

3. End Date for date ranges

The end date of a date-range if the exact date that the voucher was collected is unknown.

4. Time

Time of collection (24-hour clock).

5. Collector

Name(s) of collector(s). Separate with commas if more than one.

6. Collector ID Number

The original ID assigned to the voucher by the collector at the time of collection. This is a traditional, standard datum recorded in field notes and on labels of vouchers by the collector at the time of the collection. This is not an ID assigned later during cataloging (see Specimen ID).

7. Habitat

Description of habitat where collection was made.

8. Voucher Type

A pull down pick list for the type of voucher collected.

Voucher Type	NPS I&M Definition
Specimen	Whole or partial specimen (e.g. skin, bone, egg, blood, etc. Specify in Details.
Image	Hardcopy or digital image
Audio Recording	Tape or digital audio recording
Other	Voucher other than specimen, image or audio recording. Specify in Details.

9. Voucher Type Details

A field for any additional comments on the voucher.

D. Location When Collected

This group of fields contains information associated with where the voucher was collected, including lat/long or UTM coordinates, elevation, locality description, etc.

1. Description

For NCPN parks:

The value of a scientific collection depends largely upon the accuracy of the location (and date) information. The location description should be as complete as possible so that it can be found in future years. At minimum, the description should include a location within the park, and the county and state. A short description of the directions to the sampling location is desirable; abbreviations can be used as necessary. This field should include only data that appears on the specimen label; no data should be entered that has been inferred.

NCPN example data entry format(s):

- Capitol Reef National Park, ca. 2.5 mi N jct Notom Road & Burr Trail, Garfield County, UT
- CANY, Squaw Canyon, ca. 1 mi W of Cave Spring, San Juan Co., UT

2. Local Location Code

An optional code identifying a permanent locally recognized location where the collection was made. This field can be used in lieu of coordinates when numerous records need to be added.

For NCPN parks:

This is a field that is currently not used by the NCPN, though it will likely be used for data collected at fixed sites during the monitoring phase of the I&M program.

3. Datum

Datum for UTM coordinates (i.e. NAD27 or NAD83).

4. Location Coordinate System

- Lat/Long DD:** Latitude and longitude in decimal degrees where the collection was made.
- Lat/Long DMS:** Latitude and longitude in degrees, minutes, and seconds where the collection was made.
- UTM:** UTM X and Y coordinates (easting and northing) where the collection was made, together with the UTM Zone.

For NCPN parks:

The NCPN preference for location coordinates is UTM.

5. Coordinate Error

Estimated accuracy of the location coordinates in meters.

6. Elevation

Elevation where the collection was made.

7. Units

Units for elevation (feet or meters).

E. Record Information

1. Comments

Additional information pertinent to the values entered in the entire record if clarification or elaboration is desired.

For NCPN parks:

Data from ANCS+ often have no corresponding fields in the NPSpecies database. For example, the collector may refer to a species by a common name that is different from the common name selected at certification, but which can be helpful in identifying the species. Other collectors submit specimen weights or reproductive status. Use this field liberally, to capture as much information as possible on a voucher.

NCPN example data entry format(s):

- Common name reported as Colorado chipmunk, identified by collector, additional comments: mammal study skin formerly listed: *Eutamias scrutator inyoensis* - Inyo chipmunk.
- SVL 50 mm, mass 12.5 g at capture. Collection method = alive. Condition of specimen = good.

2. Data Source

The principle source of the voucher, e.g. BRCA ANCS+ voucher data.

NCPN example data entry format(s):

- ANCS+ voucher from 2001-2003 USGS inventory
- CANY ANCS+ voucher

3. Created By

The name of the person who created the Voucher Profile record.

For NCPN parks:

Enter your first initial and last name, followed by your park or program affiliation. If you are editing a record previously created or edited by someone else, append your information to the existing information.

- E. Nance, NCPN I&M
- K. Cahill, BRCA
- J. Alexander, ZION, E. Nance, NCPN I&M

VI. NCPN Reference Profile Standards

References, while not incontrovertible evidence, also serve as substantiation for a species' presence in a park. When evaluating a reference for NPSpecies, consider some of the following criteria:

- The reference is focused on a specific species or species group within the park.
- The author is known and is a credible authority.
- The reference is published in a recognized scientific journal.
- Primary sources vs. secondary sources. Primary references directly reflect actual observations or vouchers supporting the status of a species in a park. Secondary references summarize existing knowledge without directly reflecting the actual supporting vouchers or observations. Field guides and county-based floras are an example.

Note that a Park-Name profile must exist for all species listed in the reference, before the reference can be linked.

REFERENCE PROFILE

Delete Set Default Values Report Cancel Save Close

BibKey ID

Citation

Sensitivity may only be edited for new records.

Sensitivity Level
☒ Public
☐ NPS Only

Year Published
 Work Form

Name Link Auditing Information

Park Code	Created By	Created Date	Last Mod. By	Last Mod. Date	Comments
Record: <input type="text"/>					

Names Documented In NatureBib Reference Above Link More Names Unlink Names

Park Code	TSN	Kingdom	Category	Order	Family	Std. Scientific Name	Std. Common Name(s)	Doc. Scientific Name	Doc. Common
Record: <input type="text"/>									

Record: of 1

Unique index string for each entry in NatureBib

A. Enter the BibKey ID number as,

- #123456

and the Citation as,

- Persons, Trevor B., Nowak, Erika M. 2004. Inventory of Amphibians and Reptiles at Hovenweep National Monument. Note: The citation entry that is manually typed in will be replaced with the citation in NatureBib when the backend file is uploaded into the Oracle (web-based) version at certification. Type in just enough information (author, date, title) so that the WASO office will have the basic information on the reference should they encounter upload errors.

Select the Link More Names button to add scientific names as they are listed in the source document. You will need to create Park-Name profiles for legacy references which list outdated or unused names, and link those names to the reference you are working with. These outdated names will be mapped to their modern counterpart names during the process of certification.

VII. NCPN Observation Profile Standards

For NCPN parks, observations are used in NPSpecies as the sole source of evidence for a Present in Park species only when vouchers or references do not exist. An observation is a record in which event (date, time, observer, etc.) and location information for a species occurrence is permanently cataloged, but no physical evidence is collected. An example of when to use an observation record follows:

A park biologist has observed a species wintering in the park; however, has not photographed or collected the species nor is there any associated report or publication. The biologist is a knowledgeable and credible source. The species has not been included in other species lists or sources. In this instance, add the species to the park list and obtain observation details from the biologist - when observed, location, name of observer, associated habitat or other details. Enter this observation information as supporting evidence.

Although most NCPN parks keep wildlife observation cards submitted by staff and visitors, these are usually unconfirmed and of little value in determining the actual presence of a species in a park. As part of the certification process, on a category by category basis, the certifier will be asked to review park holdings of wildlife observation cards and select those they deem to be from reliable sources as observational evidence for the database. When reliable observations from these wildlife observation cards support direct evidence of breeding, an Observation profile should be created. In instances when a final report deliverable contains multiple observation records supporting direct evidence of breeding, it is unnecessary to create Observation profiles. The final report can be listed as the Residency Data Source, with the actual direct or indirect form of evidence listed in the Details section. Verifiable observation records can also play a valuable role in establishing that a species is still in a park, and not Historic. This is especially important when only old vouchers (50 years) are the only evidence for a species in the database.

Note that a Park-Name profile must exist for all species listed in the reference, before an observation can be linked.

A. Park Code/TSN

After entering the 4 letter park acronym and the TSN number in their appropriate fields, the Standard Scientific Name, Standard Classification, Local Classification and Preferred Local Names will auto-populate based on the same information contained in the Park-Name profile.

B. Event Information

1. Observer Number

The original ID assigned to the observation by observer at the time of observation. Observation numbers will sometimes be recorded in field notes, however, a database produced as a deliverable for an I&M project will usually be the only place these numbers are recorded. This is not an ID assigned later during cataloging (see Specimen ID).

2. Doc. Sci. Name

Scientific name that was documented when the species was observed (the name as recorded for observations).

For NCPN parks:

The documented scientific name is the name in the source material, usually containing the embedded authorities. Enter this name exactly as it appears in the source material.

NCPN example data entry format(s):

- *Chrysothamnus nauseosus* (Pall.) Britt. var. *gnaphaloides* (Greene) Hall
- *Thermopsis montana* Nutt. ex T. & G.
- *Neotoma* cf. *Neotoma cinerea*

3. Date

The date that the observation was made or the beginning date of a date-range if the exact date is unknown.

For NCPN parks:

The date format is mm/dd/yyyy. Often, the source material will contain an entry such as Apr 1976. Enter the date, 04/01/1976, and in the Comments section, enter:

- Observation date accurate to month and year only.

When the collection year is the only data supplied, enter 01/01/1976 and note:

- Observation date accurate to year only in the Comments section.

4. End Date for date ranges

The end date of a date-range if the exact date that the observation was made is unknown.

5. Time

Time of observation or collection (24-hour clock).

6. Observer

Name(s) of observer(s). Separate with commas if more than one.

7. Habitat

Description of habitat where observation was made.

VIII. Archiving the NPSpecies Database

A current working copy of the front end file and all of the associated backend files is kept under X:\Data Management\Databases - WASO\I&M NPSpecies\NPSppCurrentDatabase_XP2.2. When WASO releases a new version of the database, a copy of the outdated version is placed under X:\Data Management\Databases - WASO\I&M NPSpecies\Archive\NPSpecies Program Files. The four quarterly data downloads containing park data are archived under X:\Data Management\Databases - WASO\I&M NPSpecies\Archive\Back end files\Year.

A working copy of the database, including the park data files, should be placed on the user's local drive for ease of use. If more than one user is entering data, the backend data files will need to be placed on a shared directory.

IX. Importing Voucher Data from NCPN I&M Inventories into ANCS+

One of the results of I&M inventories are often large data files with information on the voucher specimens that were collected. These need to be sent to individual park curators for upload into their ANCS+ cataloging system. The easiest way for curators to accomplish this is via a .csv file (comma separated value file format). To create a .csv file, save the voucher data in an Excel file with this extension, instead of an .xls extension. Send the .csv file, together with the following instructions, to park curators. Note: these instructions are meant for curators who have a solid working knowledge of the ANCS+ database. If problems arise, direct curators to contact the ANCS+ database developers, ReDiscover software group at 434-975-3256.

Detach the .csv file to a working directory on your computer for later use.

Before you import the data from the .csv file, it will be a good idea to establish a 'holding' directory to receive the imported data (see 'Chapter 7, Utilities' in your ANCS+ manual for instructions) since the import process can damage existing ANCS+ records if done incorrectly.

Click on the 'Collections Management' module.

Select a collection directory – for the purposes of this example, I created a directory called TEMP-Natural History.

Click on Catalog Records.

Go to 'Select' on the menu bar and choose 'Tag' from the pull-down menu.

Click on 'Import/Export' Selected Fields from the drop-down menu. The Import/Export Formats screen will appear.

Click on the 'Create Import/Export Format' button to choose the fields to import to. The Import/Export Format Contents screen will appear.

Complete the fields on the Import/Export Format Contents screen:

- EXPORT NAME – enter a name for the format that you want to use for the import process, i.e. HOVETEST – you must enter a name or you will be prompted to enter one before you leave the screen. NOTE: the name must be 8 or fewer characters with no spaces – the program automatically attaches a .TXT extension to the name you enter.
- EXPORT DESCRIPTION – enter a description of the import/export format you are creating, for ex. ‘temporary file for HOVE natural history records’. This description will not be attached to any file that you import or export.
- FIELD DELIMITER – enter the comma character (,) to serve as your field delimiter.
- FIELD DELIMITER ASCII CODE – this field will fill in automatically.
- TEXT INDICATOR – enter the quotations character (“”) to serve as your text delimiter.
- RECORD FIELDS – the data fields available to receive imported data display in a box on the left side of the screen. To select a field, single-click on the first field you want to include in your import/export format – this highlights the field. With this field highlighted single-click on the ‘Add Item ->’ in the middle of the screen, and note that the field appears in the box on the right side of the screen. Add the following field names IN THE EXACT ORDER:
 - Catalog #
 - Ctrl Prop
 - Class 1
 - Class 2
 - Class 3
 - Class 4
 - Sci. Name
 - Common Name
 - Accession #
 - Location
 - Object Status
 - Status Date
 - Item Count
 - Storage Unit
 - Description
 - Collector
 - Collection #
 - Collection Date
 - Condition
 - Cataloger
 - Identified By
 - Locality
 - Park
 - County
 - State
 - UTM Z/E/N
 - Elevation

When you have finished adding the above fields, click on the OK button to return to the Import/Export Formats screen to continue the import process.

Click on the 'Import' button to import the .csv file. A list of available import formats will appear – click on the one you just created, HOVETEST.

The system will ask for the name of the file to import - the .csv file – navigate to the location where you placed this file and click on it. Once you have clicked on the .csv file, a text box will pop up, saying that the .csv file will be converted to a .txt file – click OK. The system will now import the data into the fields that were chosen. A system message will appear in the upper right corner of the screen telling you how many records were imported. It will also report if there is a problem in matching the data in the import file with the import/export format that you are using.

At this point, you are finished uploading the data into your holding directory. Review the records before finalizing them into ANCS+.

Appendix E. NCPN photo management guidelines



Northern Colorado Plateau Network
Inventory and Monitoring Program

National Park Service
U.S. Department of the Interior

NCPN Photo Data Management

Introduction

The NCPN Inventory and Monitoring Program has developed a data management system to organize, store, name, and retrieve digital images related to natural resource projects. Guidelines and instructions for this system and its associated database are provided in this document. Also addressed are minimum standards for photo processing and storage. A summary of the NCPN Photo Data Management is outlined in the attached flowchart (Attachment A).

Photo Equipment Guidelines

Film Cameras

We recommend that staff and contractors provide photos as 35 mm slides (preferably Kodachrome or Ektachrome). Alternatively, but less preferred, 4x6 color prints are requested.

Slides should be labeled using indelible pigment ink, or using laser-printed archival-quality slide labels. Slide labels should include: a unique ID (should be the same as digital file image name, if provided), project name, photographer, photo date, a brief identification of contents (e.g., species name, plot ID), and geographic location (UTMs or description). Slides should be stored in polypropylene slide sleeves. NCPN uses Light Impressions (www.lightimpressionsdirect.com) as a source of most of its archival storage materials

If photographs are provided, they should be delivered in individual polypropylene sleeves and within archival-quality boxes. Each photo should be labeled on the back, using archival-quality labels, with the same information elements required for slides. If a contractor is submitting photographs, corresponding tif files must also be provided on CDs.

Digital Cameras

If digital cameras are used to capture images, they should be set at the highest resolution possible to allow for the highest level of use for a photo. A minimum of 3 megapixel cameras is recommended; however, 5 megapixel cameras are preferred in order to capture the highest image quality. We recommend adjusting your camera image quality setting to *fine* or *super fine* to ensure high resolution. Remember that images can be decreased in resolution for purposes such as web use or thumbnails, but cannot be adequately increased in resolution greater than the original resolution settings. While lower image quality settings may seem to meet your needs for a whole photo, having extra detail will help maintain high quality if you need to crop and enlarge an image or later use it in a publication.

The date and time should *not* be digitally imprinted on a photo image, as it may reduce image quality and value. If your camera's internal clock is accurately set, the correct date and time should be imbedded in the photo file itself and will be saved electronically. To ensure accurate date and time settings, frequently check the calendar settings and adjust as needed.

Scanners and Scanning

When 35mm slides are acquired for a project, it will be necessary to scan these slides to create digital images. These electronic files will be used as the primary means of distributing or reproducing the images.

A variety of quality scanners are now available for scanning. The main slide scanner currently being used by NCPN is the Canon CanoScan 9900F. Instructions on scanning images using this scanner are attached in Appendix B. This scanner contains film guides for 35 mm negative strips and slides, and 120 and 4" x 5" format films. These film guides allow for quick and easy scanning and formatting of multiple images. In one scanning process, the negative strip guide allows for 24 frames and the slide guide allows for 8 frames.

Scanning specifications

Slides should be scanned at a resolution that allows good representation of detail but also have a reasonable file size (1-2 megabytes). The original slide is always accessible if greater resolution is needed. Slides can also be contracted out for scanning. Whether the work is done internally or externally, the recommended scanning settings are as follows:

- Tagged Image File Format (tif)

The advantages of scanning an image as an uncompressed tif file are improved print quality and no image degradation. Images scanned as JPEG files will lose image data over time with each editing event. If images are needed for web pages or other uses, the tif must be saved as an alternate JPEG file. Do not overwrite the tif image.

- 600 dpi (minimum)
- Scanned at the original size of slide (e.g., 1.37 x 0.9 inches)
- The resulting file size will be 1 to 2 megabytes

Example: Creating a tif image by scanning an image size of 1.37 x 0.9 inches (original size of slide) at 600 dpi will result in a file size of 1.27 megabytes. At this size, scanning in batches of 8, using the frame guide, takes less than one minute per slide.

If a slide is needed for a specific project, (i.e., will be use for cropping and enlarging, poster, presentation, publication), scan the slide at 2400 dpi, choosing the size of the slide (e.g., 1.37 x 0.9 inches), to result in a file size of 15-20 megabytes.

Example: Creating a tif image by scanning an image size of 1.37 x 0.9 inches (original size of slide) at 2400 dpi will result in a file size of 20.3 megabytes.

Editing Scanned Images

Prior to submission, project managers are responsible for reviewing the value of photos and deleting poor quality photos where necessary. NCPN staff should not edit the content of a digital image (i.e., lighting, contrast, color, etc.) The only edits that should be made to digital images are as follows:

- Rotate where horizon is level, and
- Crop edges (created during scanning) that grossly distract from the photo.

Using the NCPN Photo Management Database

The NCPN Photo Management Database replaces the previously-used digital image storage database, Extensis Portfolio. Advantages in creating an MS-Access System include greater flexibility and customizing ability.

Improvements are still being made to the database, but it is currently in working order. The new MS-Access database offers a one-page form for documenting information for each individual image. Data may be entered on an individual record basis or, more likely, multiple records may be appended to the Photo Management Database using an append query. We recommend that, when applicable, the fields listed in the table below be required for all photos submitted as part of I&M projects.

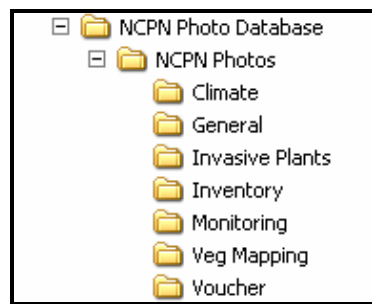
Getting Started

First, some background on how files are named and stored. Each photo, when cataloged in the database, is assigned an image “category.” Currently these categories are: general, inventory, monitoring, voucher, invasive plants, veg mapping and climate. More may be added. The category, in addition to park code and record ID, becomes part of the new image file name and dictates in which subdirectory the file will be. Category folders must be located in the *NCPN Photos* folder for proper functioning of thumbnail image display.

Example of file names:

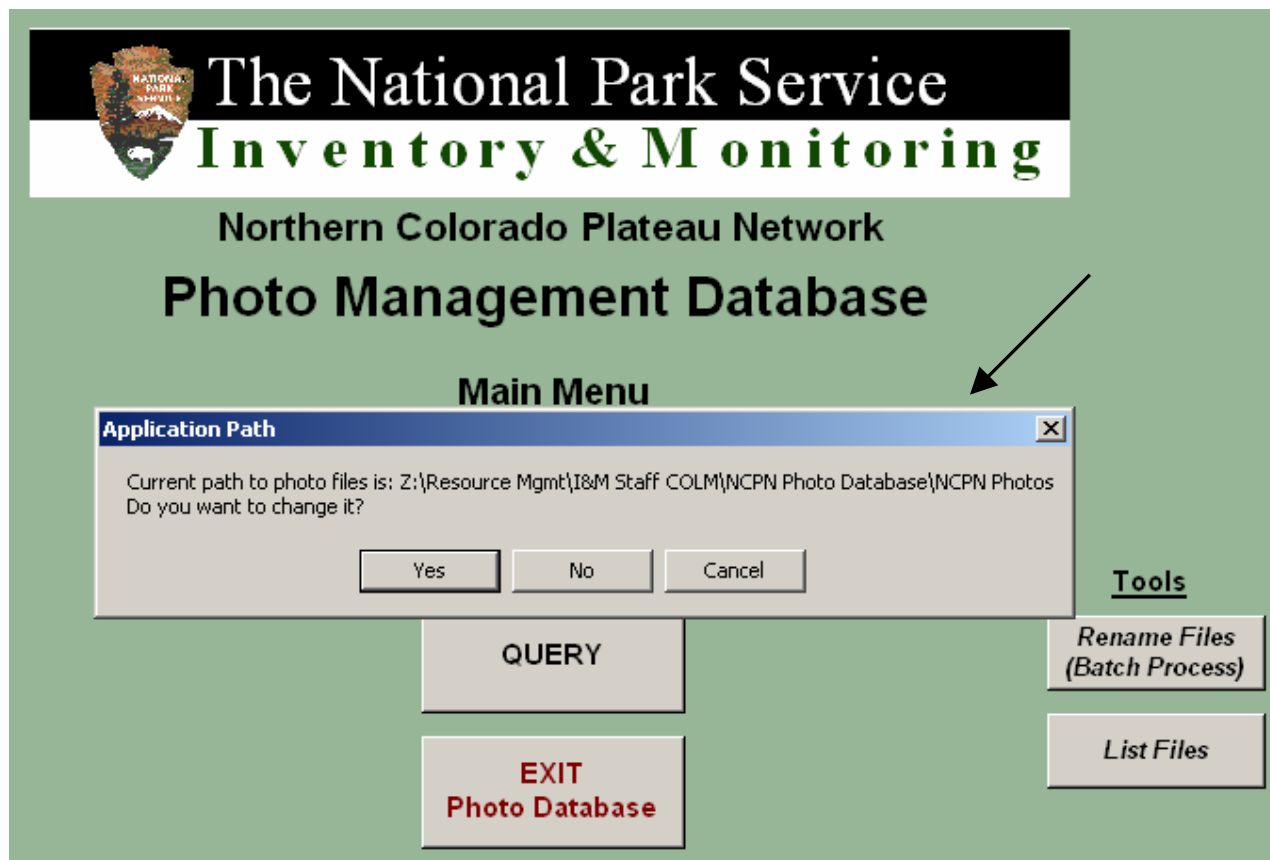
- \NCPN Photo Database\NCPN Photos\Inventory\inven_ARCH_150.tif
- \NCPN Photo Database\NCPN Photos\Monitoring\mon_CANY_425.tif

Example of NCPN photo directory structure:



Selecting the current path to photo files

Upon opening the database you will be asked if you want to change the current path to the photo files. This is an important step in that functioning of several aspects of the database depends on the correct path to the digital photos (i.e., viewing thumbnails, performing queries, renaming images, etc.).



Editing and Adding New Records

To view or add individual database records, click on **View or Enter/Edit Records** at the **Main Menu** (previous page). This will bring you to the one-page form (below) for entering/editing data.

NPS Inventory & Monitoring
 Northern Colorado Plateau Network
 Photo Management Database

Record ID: 4918

Park Code: CURE
 Photo Date: 9/5/2002
 Photographer: J. Divens
 Image Category: Veg mapping
 Location Type: veg mapping plot
 Location Ref.: CURE.0278

State: CO
 UTME: 317645.036
 UTMN: 4261592.58
 Zone: 13T

Topic Areas:
☐ Animal Studies
☒ Plant Studies
☐ Physical Sciences
☐ Aquatic Studies
☐ Atmospheric Sciences
☐ Management
☐ Paleontology

Standardized Keywords:
 inventory
 plant communities

Project: NCPN Vegetation Mapping Project
 Location Description: Steven's Creek Campground
 Photo Description: Plot
 Comments:
 Species:
 Community Name:
 Other Name:
 Common Name:

Original Format: digital
 ScanFormat: tif
 Original ID on Slide:
 OLD Image File ID: 80419_13.jpg
 Create File Name → vmap_CURE_4918.tif
 Rename Photo
 QUERY
 Exit to Main Menu

Find Save Clear Delete Add First Record Last Record

Previous Save Image File Next

Field Descriptions and Data Entry Instructions

A description of the photo database fields and instructions for data entry follows:

<i>Field Name</i>	<i>Description/Instructions</i>
-------------------	---------------------------------

Record ID	A unique identifier is automatically assigned for the database photo record. If the record is deleted, this number will not be reused.
Original ID on Slide	Reference or ID assigned to an image by the photographer. If digital images are provided as well, the Original ID on Slide may or may not be the same as the image file name provided by the project manager.
Project	Project associated with photograph. <i>Example:</i> 2001-2002 Mammal Inventory, or NCPN Vegetation Mapping Project.
Photographer	Name of person(s) who took photo. If this is an NPS photo and there is no photographer name, enter "NPS Photo." If photographer is not known, enter "Photographer unknown."

Location Type	Specific type of location; select value from pull-down list. <i>Example:</i> climate station, gauging station, photopoint, point count location, transect, veg mapping plot, and waypoint.
Location Description	Brief description of location where photo was taken. <i>Example:</i> Cedar Breaks National Monument, Visitor Center overlook
Photo Description	Brief description of photo contents, suitable to be used as photo caption.
UTME	UTM easting coordinates of photo location.
UTMN	UTM northing coordinates of photo location.
Zone	UTM zone of coordinates.
Photo Date	Date photo was taken.
Park Code	Four-letter park code of photo location.
State	Two-letter abbreviation of state where photo was taken.
Image Category	Broad category of image, useful for querying images and necessary for naming and filing image; select values from pull-down list. <i>Examples:</i> climate, general, invasive plants, inventory, monitoring, veg mapping, and voucher. <i>Note:</i> This category will become part of the new image file name, identifying the folder in which the associated images are filed.
Location Ref	Specific ID or reference of location (e.g., plot code, gaging station, transect, photopoint).
Original Format	Source format of scanned image. Select from values in the pull-down list. <i>Example:</i> slide, negative, photo print, publication, transparency, and digital.
Scanned As	Format of final scanned image file (e.g., tif, jpg, bmp) to be saved in the category folder. The recommended format is tif. Images saved in this format are not likely to degrade over time.
Image File Name (with Create File Name)	Unique file name given to scanned image, created by a concatenation of an abbreviation of Image Category , Park Code , and Record ID . Click on Create File Name to automatically populate this field. <i>Example:</i> mon_ARCH_454.tif
Old Image File ID	Old name of image file. Reference this file name when converting images to a new format or when renaming files. This field must be populated in order to rename the image file.
Navigation Buttons	
Previous	Go to previous record.

Next	Go to next record.
Find	Displays the Find/Replace search form (Note: After entering find/replace information, place cursor in field to be searched before pressing Find Next.) This is a standard Microsoft search tool.
Save	MS Access automatically saves entered data, however, this button will also save data to the database.
Clear	This button will clear entered data from a field.
Delete	Delete entire record.
Add	Add a new record.
First	Go to first record in database.
Last	Go to last record in database.
Save Image File	Gives the option to save an image to an alternate location.
Rename Photo	See section below on Renaming Files .
Comments	Any additional comments on image.
Species	Select the species in the image from the list (by Latin or common name).
Community Name	Name of vegetation community depicted in the photo; select the value from the pull-down list (based on National Vegetation Classification System).
Other Name	Name of other feature depicted in photo (e.g., gaging station name, photopoint name).
Common Name	Populated automatically from species name.
Topic Areas	Select topic area(s) related to photo. Choices are: Animal Studies, Plant Studies, Physical Sciences, Aquatic Studies, Atmospheric Sciences, Management, and Paleontology.
Standardized Keywords	Select standardized keywords from the pull-down list. Any new keywords must be added in the look-up table, tlkpKeywords.

Renaming Files

Image files can be renamed in two ways:

1. An image file name can be changed on an *individual* basis by simply pressing the **Rename** button on the lower center of the main database form. It is important that the **Old Image File ID** and the **Image File Name** fields are correctly populated in the database and that the digital image resides in the proper **Image Category** folder prior to performing this operation. An error message will otherwise appear.

2. A **Rename Files (Batch Process)** tool is available on the **Main Menu** for renaming multiple digital image files. Prior to its use, ensure that all files have been converted to the desired format (.tif, .jpg, etc.). The preferred format is *tif*, however, format choice may be influenced by file size and future file use. The renaming tool does not convert the file, it only renames it. Ensure that the **Scanned As** field indicates the final chosen file format so that the concatenated **Image File Name** is properly assigned.

Example: An image is originally named CARE001.jpg and then converted to CARE001.tif for archiving. The resulting Image File Name should be, for example, gen_CARE_482.tif if the Image category = general, Park Code = Capitol Reef National Park or CARE, the Record ID = 482, and Scanned As = tif.

To rename files, on the **Main Menu**, select the **Rename Files (Batch Process)**. After you enter or **Browse** for the path folder of files to be renamed (rename files one folder at a time), press **Rename**. Check to see that the files were renamed properly and entirely.

After new file names are assigned to the images, use an Update Query in MS Access to add the new image file names to the associated project database.

Appending a Data Table to the Photo Database

1. Always make a backup copy of your target table, tblPhotoMain, prior to completing this process.
2. Import your data table into the Access Photo Database.

3. Use the worksheet below to match your table fields with the Photo Database fields.

Worksheet to match fields when appending data to Photo Database	
tblPhotoMain	New table corresponding field
PhotoRecordID	
OLDImageFileID	
ImageFileID	
OriginalID	
ImageType	
ScanFormat	
OriginalImageFormat	
LocationType	
LocationRef	
LocationDescription	
ProjectID	
TSN	
PhotoDescription	
ParkCode	
State	
UTME	
UTMN	
UTMZone	
CommunityName	
OtherFeatureName	
Photographer	
PhotoDate	
Comments	
picture	
ThumbClick	
Animal Studies	
Plant Studies	
Physical Sciences	
Aquatic Studies	
Atmospheric Sciences	
Management	
Paleontology	

4. Create a New query in Design View.
5. Add the new data table to the query.
6. Select Query, Append Query, and choose tblPhotoMain as table to append to.
7. Add to query, all fields in new data table to append to Photo Database.
8. Select corresponding fields from tblPhotoMain in the “Append to” field.
9. Add any additional fields in the “Append to” field from tblPhotoMain as necessary where all rows in that field will have the same value. In “Field”, type a description of

the tblPhotoMain field, colon, space, and the information to fill in for each row in parentheses (e.g., Image Type: “inventory”). Use the table above to determine which additional fields need to be added.

10. Run Append Query. Always check that the number of records to be appended is the same number of records in the original table.
11. Use ‘qryBuildFileCode’ to concatenate and populate new file name in ‘ImageFileID’ field. Change ‘PhotoRecordID’ criteria to reflect appropriate records to concatenate.
12. Use ‘qryAppendKeyword’ to add keywords to records. Enter the keyword to be added in the first field (e.g., Word: “inventory”). Change the PhotoRecordID criteria to reflect the appropriate records to associate keywords to. Check that the number of keyword records to be appended matches the original number of appended records.
13. Convert image files to tif or other desired format, if necessary, and file in the appropriate category folder.
14. Use the Rename Files tool on the Main Menu to change OldImageFileID to ImageFileID.
15. Delete the added data table and append query from Database before closing.
16. Use an Update Query to associate new file names to the database from which the data was imported.

Photo Database Query

To query the Photo Database (note that some future modifications are planned for the Photo Database Query):

- Select **Query** at the **Main Menu**.
- Enter a date range and/or up to five different fields. Fields are selected in the blanks on the left and field criteria are selected on the right. You must enter a term for both.
- Select **Run Query**. Your results will appear in the **Selected Photo List** screen.
- Press **Edit** (at the end of each line) to edit the individual record in the main form.
- In Step 1, you may select up to 12 thumbnail photos to view by placing a check mark in the Thumb Click box at the end of each record. In Step 2, click **View Thumbnails** at the top of the screen. Thumbnails will be displayed with the **Photo Description** and **Image File Name** below. Click on a photo to view full frame.

There is an alternative query tool on the main entry form. Click on the **Find** button on the lower left corner of the main entry form. This feature works as a standard Microsoft search tool.

Photograph Property and Use

Photos collected with the NPS funds and staff time are property of NPS. The **Photographer** field can be used for credits. Provide credit to photographers when possible by inserting the photographer’s name in a small font size at the bottom right of the photo.

Photos of People and Rights to Privacy

The following information was provided by the Alaska I&M Program in *Digital Photograph Management Strategy for the Alaska Inventory and Monitoring Program*.

When taking a photo of a person, the subject's right to privacy may come into play. Photos with following criteria should seek a model waiver form:

- The person is recognizable, and
- The person is not a government employee (on-duty), and
- The photo will be used for profit to the photographer.

OR

- Any photos of a minor, where the minor is recognizable.

Photos with the following criteria do not need a model waiver form:

- Photos are public domain (unless protected by law)
- Photos are not for profit
- If photos are used for profit, such as in a magazine, it is not NPS who profits

In the case of NPS, it is rarely the case where a model waiver form is needed. Typically these photos are used for education and editorial purposes, where photos of subjects are acceptable.

References

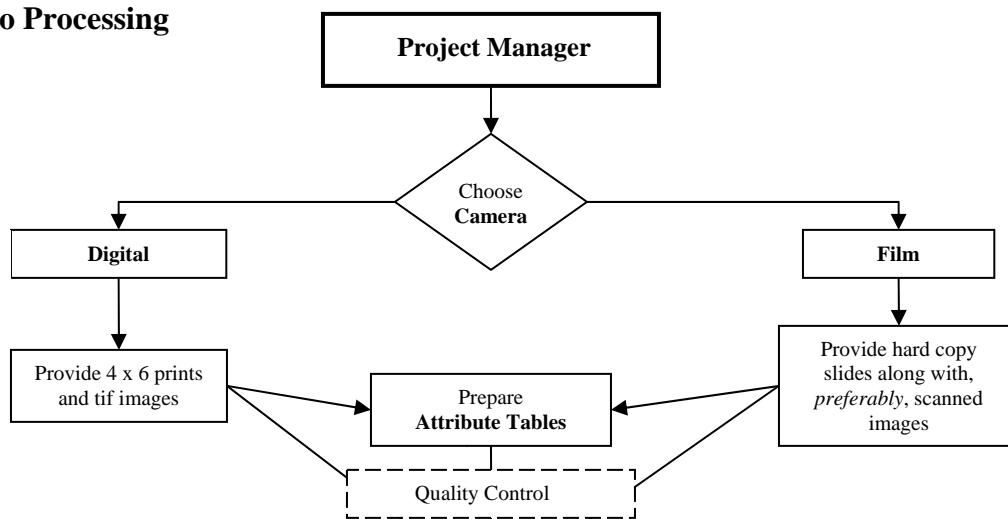
McClelland, D., and B. Obermeier. 2002. *Photoshop 7 for Dummies*, Wiley Publishing, Inc., New York, NY.

National Park Service, Harpers Ferry Center. 2003. Suitability Standards for Digital Photographic Images. <http://www.nps.gov/hfc/pdf/digital-photo-standards.pdf>, (Accessed 9/14/04).

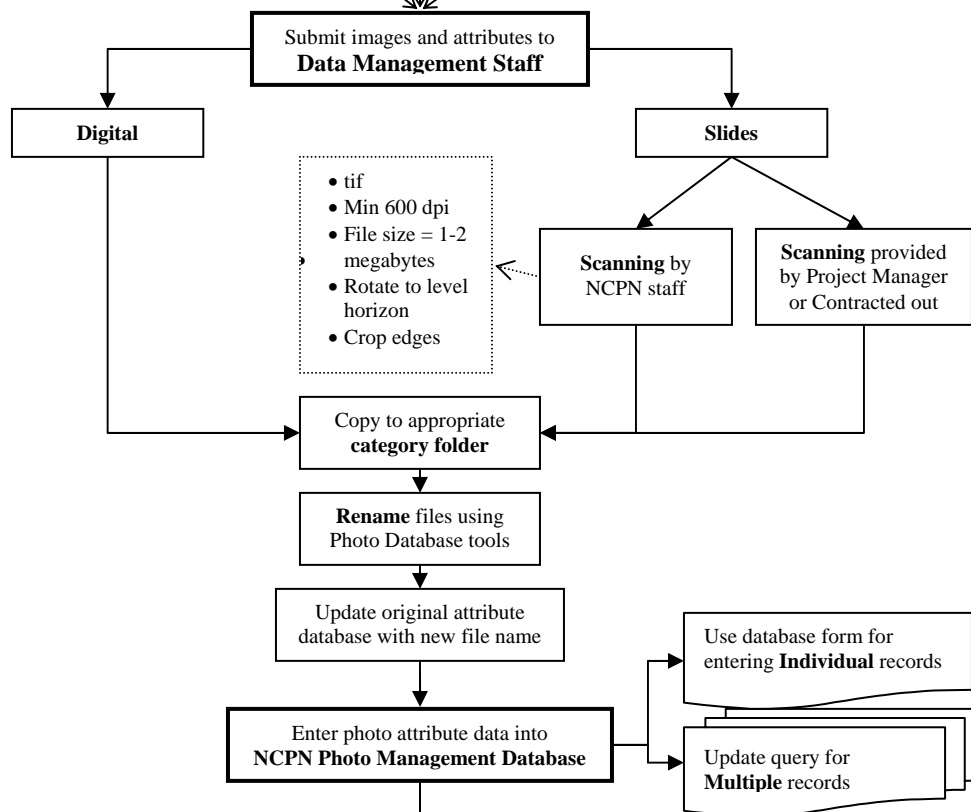
Southwest Alaska Network and Southeast Alaska Network. 2004. *Digital Photograph Management Strategy for Alaska Inventory and Monitoring Program*. National Park Service. Anchorage, AK. 61pp.

Attachment A. Photo Processing Flowchart

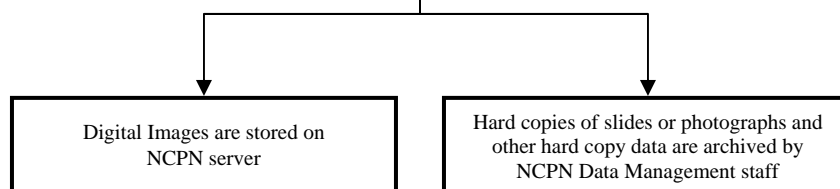
ACQUISITION



PROCESSING



LONG-TERM STORAGE



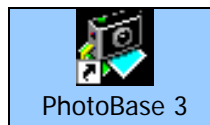
Attachment B. Scanning Slides (Using CanoScan 9900F and PhotoBase 3)

Follow these directions for scanning slides using the Canon CanoScan 9900F and PhotoBase 3:

1. Remove white protective pad under scanner lid before scanning slides.
2. Place slide frame on scanner glass (fits into grooves).
3. Place up to eight slides face down in slide frame.
 - Position the slides face down (e.g., **Kodak** name facing up); top of image is nearest the left edge of scanner.
 - To maintain order, position the slides as follows:

5	1
6	2
7	3
8	4

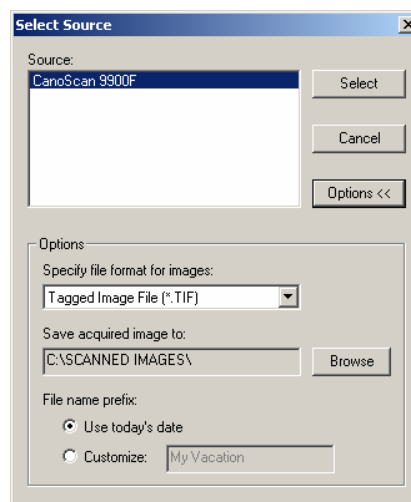
- Close scanner cover.
 - Turn on scanner (lower front of scanner). (Troubleshooting – if computer does not register scanner, a message will be display. Try turning the scanner off and then back on, or disconnect and reconnect cables.)
4. Start **PhotoBase 3** from Desktop shortcut.



5. In **PhotoBase 3**, select icon to **Acquire Image**.



6. The **Select Source** screen will appear. Select **Options<<**. Specify creation of .tif images and location of saved files. These setting will be saved for the next scanning event. Then press **Select**. It is not necessary to set a file name prefix since file names will be changed later in the process.

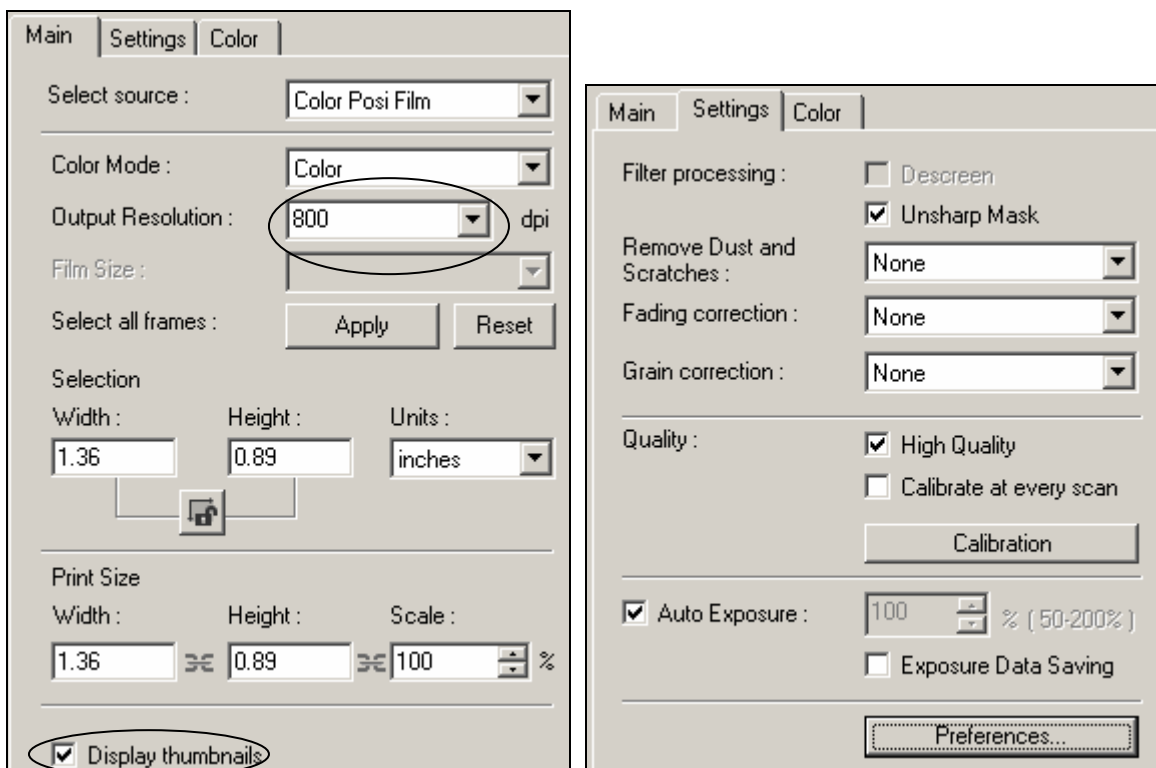


7. The slides in the scanner should **Preview** automatically. If not, select **Preview** in upper left corner. (To set automatic preview execution, select the **Settings** tab, and then **Preferences**.)

Note: Occasionally, a slide will preview sideways (reason unknown). If this happens, try turning slide 180° and rescan.

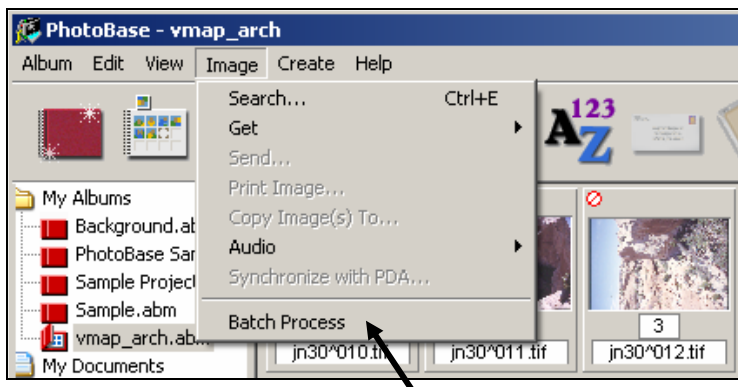
8. Select settings under Main, Settings, and Color tabs. These settings will apply automatically in successive scans.

- Select **Advanced Mode** (vs. **Simple Mode**) in lower right of screen.
- See suggested settings below. Note especially **Output Resolution** of **800 dpi** and check **Display thumbnails**. **Selection** and **Print size** will be filled in after **Preview** appears.



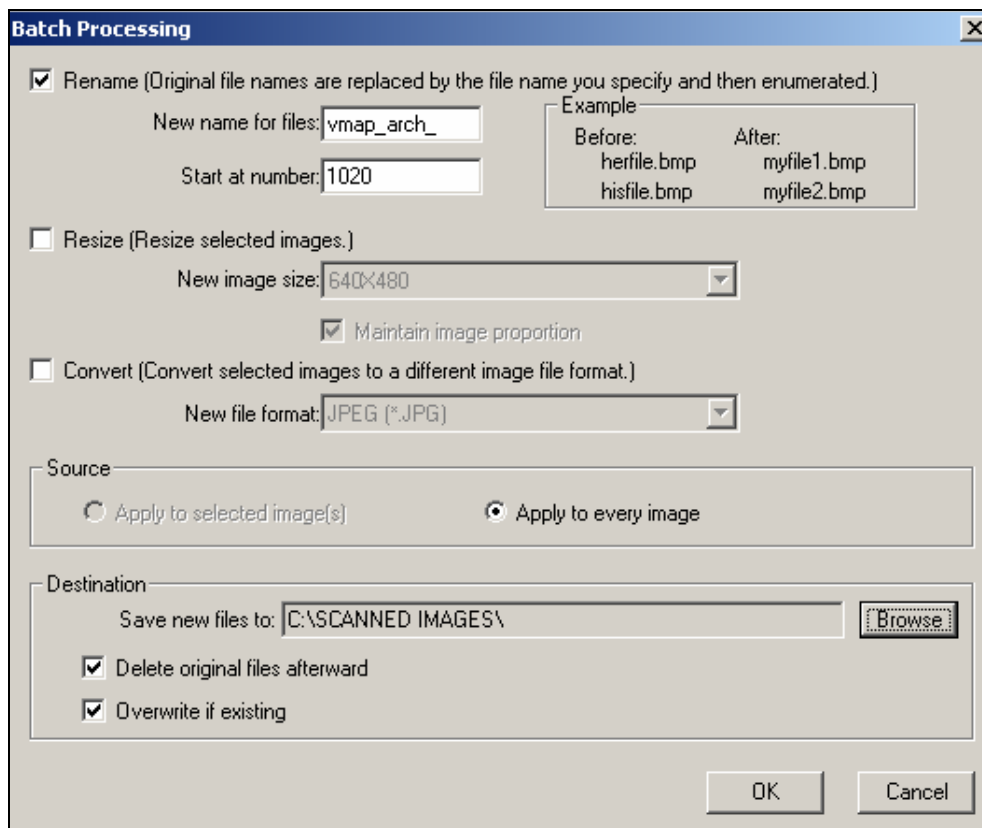
- After Preview is executed, thumbnails will appear. Insert a **check mark** next to each thumbnail to be scanned, or to select all frames, press **Apply** under the **Main** menu tab.
9. Select **Scan** in upper left of screen.
10. When all images are scanned, close **ScanGear CS**.

11. To change file names, select **Image, Batch Process**.



12. Enter settings as follows and then select **OK**:

- Enter prefix for **New name for files**
- Enter **Start at number**
- Deselect **Resize**
- Deselect **Convert**
- Select **Source** – indicate **Apply to selected image(s)** or **Apply to every image**
- Set **Destination** – **Save new files to:** (**Browse** for location)
- Select **Delete original files afterward** and **Overwrite if existing**



Appendix F. Database naming conventions

Introduction

The following recommended naming standards guidelines were originally developed by Simon Kingston (WASO-I&M) and Angie Southwold (AKSO) after the 2002 NPS I&M Data Manager's meeting and distributed for comment and review in October of the same year. They were intended to support the development of I&M MS Access database applications in general.

The recommendations were reviewed and revised by Chris Dietrich (WASO-I&M) after the 2004 Data Manager's meeting with the intent of adopting them as the standard naming convention for Natural Resource Database Template (NRDT) applications (see National Park Service Natural Resource Database Template (NRDT) Data Standards Submission and Approval Process, <http://www1.nrintra.nps.gov/im/apps/BOFAT>).

Adopting a convention and applying it consistently is important for data sharing and application maintenance and support. Because many I&M applications are designed for long-term (more than 5 years) use, NCPN recommends that developers, including NPS staff, contractors and partners, follow the naming standards outlined in this document to enhance continuing application support and to maximize standardization among NRDT applications.

Rule #1	Recommended Implementation
Prefix table names	<ul style="list-style-type: none"> • Prefix each table with the appropriate category abbreviation. • There are three categories of tables. A data table is most common and contains data collected in the field. A lookup table contains a list of valid values that references some other field in the database. A cross-reference (or linking) table is the table created to accurately depict a many-to-many relationship; this table references the two parent tables and contains their primary keys. • To help distinguish a table type, prefix the table name with one of the following: • Data Table = tbl_ • Lookup Table = tlu_
	Examples of Recommended Design
	tbl_Locations tbl_Events tlu_Parks tlu_Observers xref_Location_Event xref_Event_Bird_Observation

Rule #2	Recommended Implementation
Prefix objects	<p>Prefix each database object with the appropriate abbreviation.</p> <p>The following list contains some recommended prefixes for other database objects:</p> <ul style="list-style-type: none"> • Form <ul style="list-style-type: none"> • Main Form = frm_ • Query (for criteria) = frm_qry_ • List (read-only grid) = frm_lst_ • Edit (for data entry) = frm_edt_ • Sub Form = frm_sub_ • Query <ul style="list-style-type: none"> • Select = qry_ • Insert = qry_ins_ • Update = qry_upd_ • Delete = qry_del_ • Append = qry_app_ • Make-Table = qry_mak_ • Cross-Tab = qry_xtab_ • Report <ul style="list-style-type: none"> • Main Report = rpt_ • Sub Report = rpt_sub_ • Macro = mac_ • Module = mod_ • Index = idx_

Rule #3	Recommended Implementation	
Avoid spaces	<p>Do not use spaces within a file, table or field name.</p> <p>Many users include spaces in file, table and field names for easy readability. Instead, use an underscore between words (see Separate words rule – Rule #4).</p> <p>Access is one of the only databases to even allow the use of spaces within names, so other databases, development tools, and analysis tools often have difficulty using these fields without custom workarounds added by the programmer or user.</p>	
	Examples of Design	Examples of Better/Recommended Design
	Location ID Park Code Project Code	Location_ID Park_Code Project_Code

Rule #4	Recommended Implementation	
Separate words	Use underscores to separate words within a single table or field name. Many users rely on mixed case table and field names for easy readability. Rather than relying upon the way the name is typed, a better choice is to separate words with an underscore (_). The name then resembles written text and words within the name are easily identified. Many analysis tools ignore case. When data is imported from a database, the tool converts field names to all upper or all lower case. By using underscores to separate words, the fields maintain readability. However, keep in mind that some databases are case-sensitive. This means that any user must type the names exactly as they have been created to get the expected results.	
	Examples of Design	Examples of Better/Recommended Design
	EventID StartDate EndDate AlphaCD	Event_ID Start_Date End_Date Alpha_CD

Rule #5	Recommended Implementation	
Specific names	Choose a name that accurately identifies the data to be stored in a table or field. Strive to create names that accurately define the data stored within. If a name is too vague, users must rely upon supplemental documentation for definitions. Also, users may enter data that the field was not intended to store.	
	Examples of Design	Examples of Better/Recommended Design
	Habitat Percent_Cover Tree_Size	Viereck_Class_Code Tree_Cover_Percent Tree_DBH_cm

Rule #6	Recommended Implementation	
Consistent case	Use mixed case text within a table or field name. All uppercase words are especially straining to the human eye. Mixed case text presents a readable format that is more easily and quickly read. If data will be ported to an enterprise-level database system (i.e., Oracle) consider using uppercase object and field names. SQL Server will honor mixed case object and field names.	
	Examples of Design	Examples of Better/Recommended Design
	SPECIES_CODE SPECIES_COUNT behavior_code	Species_Code Species_Count Behavior_Code

Rule #7	Recommended Implementation	
Avoid special characters	Do not use special characters in a table or field name. Allowable characters include A-Z, a-z, 0-9, and _ (underscore to separate words). Additionally, a name should never begin with a number. Do not use dashes in table or field names. Access is one of the only databases to even allow the use of special characters within names, so other databases, development tools, and analysis tools often have difficulty using these fields without custom workarounds added by the programmer or user.	
	Examples of Design	Examples of Better/Recommended Design
	Project Park/Region Project\$ ProjLead_Phone# Project Complete?	Project_Park_Or_Region Project_Cost Proj_Lead_Phone_Num Is_Project_Complete

Rule #8	Recommended Implementation	
Avoid unknown abbreviations	<p>Avoid abbreviations unless necessary due to field length.</p> <p>If an abbreviation is needed, make every attempt to use one that is known within the organization or one that can be easily deciphered. Avoid an abbreviation that is a word itself or has multiple meanings.</p> <p>Some older flat file systems limit table (file) and field names to 8 or 10 characters, respectively. Most relational databases have a limit of approximately 30 characters. Since Access and Oracle are the NPS standards and they do not impose these limits, mandating the use of terse names and extensive abbreviating for all tables and fields is not necessary. However, it is strongly recommended that spatial data or attribute data which could be imported into GIS or other PC database software (ArcView, dBase, etc.) use 8 character maximum table and 10 character maximum field names. Keep in mind that in cases where data is exported into a DBF, table and field names longer than 8 or 10 characters, respectively, will be truncated upon import, potentially sacrificing information by resulting in duplicative or unclear naming. In other cases, take advantage of additional characters to eliminate the ambiguity of table and field names.</p>	
	Examples of Design	Examples of Better/Recommended Design
	SmpTrnID Spp_Cd VeStCnt GeoLocateID	Sample_Transect_ID Spp_Code Vertical_Strata_Count Site_ID

Rule #9	Recommended Implementation	
Limit length	<p>Limit the length of table and field names to approximately 20 characters maximum (also see Rule #8).</p> <p>This limit is set more for practicality than any other reason. Most database servers do have a maximum limit of approximately 30 characters, though. Shorter names can be typed more quickly and are easier to remember. Also, longer names can sometimes extend past the width of set drop down lists, so only the first part of a name is visible. If data will be used in GIS attribute tables for shapefiles (i.e., dBase format), consider limiting field names to 10 characters. Find an optimal field length where the name is not too tedious, but the name still clearly represents the data stored in it.</p>	
	Examples of Design	Examples of Better/Recommended Design
	Water_Quality_Evaluation_Code Geomorphic_Disturbance_Description Area_Average_Azimuth_Magnetic	H2O_Quality_Eval_Code Geomorphic_Disturb_Desc Area_Avg_Azimuth_Mag

Rule #10	Recommended Implementation	
Primary or Foreign Key Identification	Use a standard suffix for primary and foreign keys. Identify the primary keys with a _ID suffix and foreign keys with the _IDF suffix.	
	Examples of Design	Examples of Better/Recommended Design
	SPECIES_KEY EventFKey	Species_ID Event_IDF

Rule #11	Recommended Implementation	
Single value	Choose a field to contain a single value. Data entry, validation and retrieval are more difficult when a single field contains multiple, independent values.	
	Examples of Design	Examples of Better/Recommended Design
	Full_Name City_State_Zip	First_Name, Last_Name City_Name, State_Code, Zip_Code

Rule #12	Recommended Implementation	
Avoid storing calculations	Choose a field to be independent of all other field values. Rather than storing a calculated value in the database, a better choice is to store in independent operands and perform calculations dynamically for display within queries, forms, or reports. Stored calculations run the risk of not being updated when one of the individual elements changes. However, in certain instances, a trade-off in efficiency vs. storage space or security concerns may necessitate storage of calculated values.	
	Examples of Design	Examples of Better/Recommended Design
	Plot_Area_m2	Plot_Width_m, Plot_Length_m

Rule #13	Recommended Implementation	
Singularize names	Choose the singular noun or noun_adjective form for a field name. Where applicable, try to use singular Noun_Adjective format rather than plural Noun_Adjective or Adjective_Noun structures.	
	Examples of Design	Examples of Better/Recommended Design
	Life_Stages Scientific_Species_Name	Life_Stage Species_Name_Scientific

Rule #14	Recommended Implementation		
Avoid reserved words	Avoid a table or field name that is a word reserved for use by the database server. Each database server and development environment has a set of reserved words that should not be used as table or field names. Access, in particular, will allow the creation of a field that is a reserved word. It will often not cause problems until a later time, during the creation and execution of queries, forms, or reports.		
Microsoft Jet Database Engine SQL Reserved Words (Source: Microsoft Access 97 help file) The following list includes all words reserved by the Microsoft Jet database engine for use in SQL statements. The words in the list that aren't in all uppercase letters are also reserved by other applications. Words followed by an asterisk (*) are reserved but currently have no meaning in the context of a Microsoft Jet SQL statement (for example, Level and TableID).			
A ADDALL Alphanumeric — See TEXTALTER And ANY AS ASC AUTOINCREMENT — See COUNTER Avg B-C Between BINARY BIT BOOLEAN — See BIT BY BYTE CHAR, CHARACTER — See TEXT COLUMN CONSTRAINT Count COUNTER CREATE CURRENCY D DATABASDATE — See DATETIME DATETIME DELETE DESC DISALLOW DISTINCT	DISTINCTROW DOUBLE DROP E-H Eqv EXISTS FLOAT, FLOAT8 — See DOUBLE FLOAT4 — See SINGLE FOREIGN FROM GENERAL — See LONGBINARY GROUP GUID HAVING I IEEEDOUBLE — See DOUBLE DOUBLE IEEE SINGLE — See SINGLE SINGLE IGNORE Imp In IN INDEX INNER INSERTINT, INTEGER, INTEGER4 — See LONG INTEGER1 — See BYTE INTEGER2 — See SHORT INTO Is	J-M JOIN KEY LEFT Level* Like LOGICAL, LOGICAL1 — See BITLONG LONGBINARY LONGTEXT Max MEMO — See LONGTEXT Min Mod MONEY — See CURRENCY N-P Not NULL NUMBER — See DOUBLE DOUBLE NUMERIC — See DOUBLE DOUBLE OLE OBJECT — See LONGBINARY On OPTION Or ORDER Outer* OWNERACCESS PARAMETERS PERCENT PIVOT PRIMARY PROCEDURE	Q-S REAL — See SINGLE REFERENCES RIGHT SELECT SET SHORT SINGLE SMALLINT — See SHORT SOME StDev StDevP STRING — See TEXTSum T-Z TABLE TableID* TEXT TIME — See DATETIME TIMESTAMP — See DATETIME TOPTRANSFORM UNION UNIQUE UPDATE VALUE VALUES Var VARBINARY — See BINARY VARCHAR — See TEXT VarP WHERE WITH Xor YESNO — See BIT

Microsoft® SQL Server™ 2000 Reserved Keywords (Source: http://msdn.microsoft.com/library/default.asp?url=/library/en-us/tsqlref/ts_ra-rz_9oj7.asp. Date accessed: 6/22/2004). Microsoft® SQL Server™ 2000 uses reserved keywords for defining, manipulating, and accessing databases. Reserved keywords are part of the grammar of the Transact-SQL language used by SQL Server to parse and understand Transact-SQL statements and batches. Although it is syntactically possible to use SQL Server reserved keywords as identifiers and object names in Transact-SQL scripts, this can be done only using delimited identifiers. In addition, the SQL-92 standard defines a list of reserved keywords. Avoid using SQL-92 reserved keywords for object names and identifiers. The ODBC reserved keyword list (shown below) is the same as the SQL-92 reserved keyword list. **Note:** The SQL-92 reserved keywords list sometimes can be more restrictive than SQL Server and at other times less restrictive. For example, the SQL-92 reserved keywords list contains INT, which SQL Server does not need to distinguish as a reserved keyword. Transact-SQL reserved keywords can be used as identifiers or names of databases or database objects, such as tables, columns, views, and so on. Use either quoted identifiers or delimited identifiers. The use of reserved keywords as the names of variables and stored procedure parameters is not restricted.

ADD	CONTAINS	END	JOIN
ALL	CONTAINSTABLE	ERRLVL	KEY
ALTER	CONTINUE	ESCAPE	KILL
AND	CONVERT	FILLFACTOR	LEFT
ANY	CREATE	FOR	LIKE
AS	CROSS CURRENT	FOREIGN	LINENO
ASC	CURRENT_DATE	FREETEXT	LOAD
AUTHORIZATION	CURRENT_TIME	FREETEXTTABLE	NATIONAL
BACKUP	CURRENT_TIMESTAMP	FROM	NOCHECK
BEGIN	CURRENT_USER	FULL	NONCLUSTERED
BETWEEN	CURSOR	FUNCTION	NOT
BREAK	DATABASE	GOTO	NULL
BROWSE	DBCC	GRANT	NULLIF
BULK	DEALLOCATE	GROUP	OF
BY	DECLARE	HAVING	OFF
CASCADE	DEFAULT	HOLDLOCK	OFFSETS
CASE	DELETE	IDENTITY	ON
CHECK	DENY	IDENTITY_INSERT	OPEN
CHECKPOINT	DESC	IDENTITYCOL	OPENDATASOUR
CLOSE	DISK	IF	CE
CLUSTERED	DISTINCT	IN	OPENQUERY
COALESCE	DISTRIBUTED	INDEX	OPENROWSET
COLLATE	DOUBLE	INNER	OPENXML
COLUMN	DROP	INSERT	OPTION
COMMIT	DUMMY	INTERSECT	OR
COMPUTE	DUMP	INTO	ORDER
CONSTRAINT	ELSE	IS	OUTER
PERCENT	RESTRICT	SOME	OVER
PLAN	RETURN	STATISTICS	UPDATE
PRECISION	REVOKE	SYSTEM_USER	UPDATETEXT
PRIMARY	RIGHT	TABLE	USE
PRINT	ROLLBACK	TEXTSIZE	USER
PROC	ROWCOUNT	THEN	VALUES
PROCEDURE	ROWGUIDCOL	TO	VARYING
PUBLIC	RULE	TOP	VIEW
RAISERROR	SAVE	TRAN	WAITFOR
READ	SCHEMA	TRANSACTION	WHEN
READTEXT	SELECT	TRIGGER	WHERE
RECONFIGURE	SESSION_USER	TRUNCATE	WHILE
REFERENCES	SET	TSEQUAL	WITH
REPLICATION	SETUSER	UNION	WRITETEXT
RESTORE	SHUTDOWN	UNIQUE	

ODBC Reserved Keywords (Source: http://msdn.microsoft.com/library/default.asp?url=/library/en-us/tsqlref/ts_ra-rz_9oj7.asp. Date accessed: 6/22/2004). The following words are reserved for use in ODBC function calls. These words do not constrain the minimum SQL grammar; however, to ensure compatibility with drivers that support the core SQL grammar, applications should avoid using these keywords. This is the current list of ODBC reserved keywords. For more information, see *Microsoft ODBC 3.0 Programmer's Reference, Volume 2, Appendix C*.

ABSOLUTE	COLLATE	DISCONNECT	IMMEDIATE
ACTION	COLLATION	DISTINCT	IN INCLUDE
ADA	COLUMN	DOMAIN	INDEX
ADD	COMMIT	DOUBLE	INDICATOR
ALL	CONNECT	DROP	INITIALLY
ALLOCATE	CONNECTION	END	INNER

ALTER	CONSTRAINT	END-EXEC	INPUT
AND	CONSTRAINTS	ESCAPE	INSENSITIVE
ANY	CONTINUE	EXCEPT	INSERT
ARE	CONVERT	EXCEPTION	INT
AS	CORRESPONDING	EXEC	INTEGER
ASC	COUNT	EXECUTE	INTERSECT
ASSERTION	CREATE	EXISTS	INTERVAL
AT	CROSS	EXTERNAL	INTO
AUTHORIZATION	CURRENT	EXTRACT	IS
AVG	CURRENT_DATE	FALSE	ISOLATION
BEGIN	CURRENT_TIME	FETCH	JOIN
BETWEEN	CURRENT_TIMESTAMP	FIRST	KEY
BIT	CURRENT_USER	FLOAT	LANGUAGE
BIT_LENGTH	CURSOR	FOR	LAST
BOTH	DATE	FOREIGN	LEADING
BY	DAY	FORTAN	LEFT
CASCADE	DEALLOCATE	FOUND	LEVEL
CASCADE	DEC	FROM	LIKE
CASE	DECIMAL	FULL	LOCAL
CAST	DECLARE	GET	LOWER
CATALOG	DEFAULT	GLOBAL	MATCH
CHAR	DEFERRABLE	GO	MAX
CHAR_LENGTH	DEFERRED	GOTO	MIN
CHARACTER	DELETE	GRANT	MINUTE
CHARACTER_LENGTH	DESC	GROUP	MODULE
CHECK	DESCRIBE	HAVING	MONTH
CLOSE	DESCRIPTOR	HOURL	NAMES
COALESCE	DIAGNOSTICS	IDENTITY	NATIONAL
NATURAL	PRECISION	SIZE	TRIM
NCHAR	PREPARE	SMALLINT	TRUE
NEXT	PRESERVE	SOME	UNION
NO	PRIMARY	SPACE SQL	UNIQUE
NONE	PRIOR	SQLCA	UNKNOWN UPDATE
NOT	PRIVILEGES	SQLCODE	UPPER
NULL	PROCEDURE	SQLERROR	USAGE
NULLIF	PUBLIC READ	SQLSTATE	_USER
NUMERIC	REAL	SQLWARNING	USER
OCTET_LENGTH	REFERENCES	SUBSTRING	USING
OF	RELATIVE	SUM	VALUE
ON	RESTRICT	SYSTEM	VALUES
ONLY	REVOKE	TABLE	VARCHAR
OPEN	RIGHT	TEMPORARY ELSE	VARYING
OPTION	ROLLBACK	THEN	VIEW
OR	ROWS	TIME	WHEN
ORDER	SCHEMA	TIMESTAMP	WHENEVER
OUTER	SCROLL	TIMEZONE_HOUR	WHERE
OUTPUT	SECOND	TIMEZONE_MINUTE	WITH
OVERLAPS	SECTION	TO	WORK
PAD	SELECT	TRAILING	WRITE
PARTIAL	SESSION	TRANSACTION	YEAR
PASCAL	SESSION_USER	TRANSLATE	ZONE
POSITION	SET	TRANSLATION	

Oracle Reserved Words and Keywords (Source:

http://www.nvc.cs.vt.edu/pkgdocs/Oracle/server.805/a58234/vol2_wor.htm#421705. Date accessed 6/22/2004).

Oracle reserved words have a special meaning to Oracle and so cannot be redefined. For this reason, you cannot use them to name database objects such as columns, tables, or indexes.

Keywords also have a special meaning to Oracle but are not reserved words and so can be redefined. However, some might eventually become reserved words, so care should be taken when using them as variable or function names in an application.

	ARRAY	CHECKPOINT	CURRENT_SCHEMA
&	ARRAYLEN	CHOOSE	CURRENT_USER
:	AS	CHUNK	CURSOR
,	ASC	CLEAR	CYCLE
-	AT	CLOB	
=	AUDIT	CLONE	DANGLING
>	AUTHENTICATED	CLOSE	DATABASE
[AUTHORIZATION	CLOSE_CACHED_OPEN_CUR	DATAFILE
<	AUTOEXTEND	SORS	DATAFILES
(AUTOMATIC	CLUSTER	DATAOBJNO
.	AVG	COALESCE	DATE
+		COBOL	DBA
]	BACKUP	COLUMN	DEALLOCATE
)	BECOME	COLUMNS	DEBUG
!	BEFORE	COMMENT	DEC
/	BEGIN	COMMIT	DECIMAL
*	BETWEEN	COMMITTED	DECLARE
^	BFILE	COMPATIBILITY	DEFAULT
@	BITMAP	COMPILE	DEFERRABLE
	BLOB	COMPLETE	DEFERRED
ACCESS	BLOCK	COMPOSITE_LIMIT	DEGREE
ACCOUNT	BODY	COMPRESS	DELETE
ACTIVATE	BY	COMPUTE	DEREF
ADD		CONNECT	DESC
ADMIN	CACHE	CONNECT_TIME	DIRECTORY
ADVISE	CACHE_INSTANCES	CONSTRAINT	DISABLE
AFTER	CANCEL	CONSTRAINTS	DISCONNECT
ALL	CASCADE	CONTENTS	DISMOUNT
ALL_ROWS	CAST	CONTINUE	DISTINCT
ALLOCATE	CFILE	CONTROLFILE	DISTRIBUTED
ALTER	CHAINED	CONVERT	DML
ANALYZE	CHANGE	COST	DOUBLE
AND	CHAR	COUNT	DROP
ANY	CHAR_CS	CPU_PER_CALL	DUMP
ARCHIVE	CHARACTER	CPU_PER_SESSION	EACH
ARCHIVELOG	CHECK	CREATE	ELSE
ENABLE	GRANT	CURRENT	NATIONAL
END	GROUP	LIBRARY	NCHAR
ENFORCE	GROUPS	LIKE	NCHAR_CS
ENTRY		LIMIT	NCLOB
ESCAPE	HASH	LINK	NEEDED
ESTIMATE	HASHKEYS	LIST	NESTED
EVENTS	HAVING	LISTS	NETWORK
EXCEPT	HEADER	LOB	NEW
EXCEPTIONS	HEAP	LOCAL	NEXT
EXCHANGE	IDENTIFIED	LOCK	NOARCHIVELOG
EXCLUDING	IDGENERATORS	LOCKED	NOAUDIT
EXCLUSIVE	IDLE_TIME	LOG	NOCACHE
EXEC	IF	LOGFILE	NOCOMPRESS

EXECUTE	IMMEDIATE	LOGGING	NOCYCLE
EXISTS	IN	LOGICAL_READS_PER_CALL	NOFORCE
EXPIRE	INCLUDING	LOGICAL_READS_PER_SESSI	NOLOGGING
EXPLAIN	INCREMENT	ON	NOMAXVALUE
EXTENT	INDEX	LONG	NOMINVALUE
EXTENTS	INDEXED		NONE
EXTERNALLY	INDEXES	MANAGE	NOORDER
	INDICATOR	MANUAL	NOOVERRIDE
FAILED_LOGIN	IND_PARTITION	MASTER	NOPARALLEL
_ATTEMPTS	INITIAL	MAX	NORESETLOGS
FALSE	INITIALLY	MAXARCHLOGS	NOREVERSE
FAST	INITRANS	MAXDATAFILES	NORMAL
FETCH	INSERT	MAXEXTENTS	NOSORT
FILE	INSTANCE	MAXINSTANCES	NOT
FIRST_ROWS	INSTANCES	MAXLOGFILES	NOTFOUND
FLAGGER	INSTEAD	MAXLOGHISTORY	NOTHING
FLOAT	INT	MAXLOGMEMBERS	NOWAIT
FLOB	INTEGER	MAXSIZE	NULL
FLUSH	INTERMEDIATE	MAXTRANS	NUMBER
FOR	INTERSECT	MAXVALUE	NUMERIC
FORCE	INTO	MIN	NVARCHAR2
FOREIGN	IS	MEMBER	
FORTRAN	ISOLATION	MINIMUM	OBJECT
FOUND	ISOLATION_LEVEL	MINEXTENTS	OBJNO
FREELIST	KEEP	MINUS	OBJNO_REUSE
FREELISTS	KEY	MINVALUE	OF
FROM	KILL	MLSLABEL	OFF
FULL		MODE	OFFLINE
FUNCTION	LABEL	MODIFY	OID
GLOBAL	LANGUAGE	MODULE	OIDINDEX
GLOBALLY	LAYER	MOUNT	OLD
GLOBAL_NAME	LESS	MOVE	ON
GO	LEVEL	MTS_DISPATCHERS	ONLINE
GOTO	QUEUE	MULTISET	SYSTEM
ONLY	QUOTA		
OPCODE	RANGE	SD_SHOW	TABLE
OPEN	RAW	SECTION	TABLES
OPTIMAL	RBA	SEGMENT	TABLESPACE
OPTIMIZER_G	READ	SEG_BLOCK	TABLESPACE_NO
OAL	REAL	SEG_FILE	TABNO
OPTION	REBUILD	SELECT	TEMPORARY
OR	RECOVER	SEQUENCE	THAN
ORDER	RECOVERABLE	SERIALIZABLE	THE
ORGANIZATION	RECOVERY	SESSION	THEN
OVERFLOW	REF	SESSION_CACHED_CURSORS	THREAD
OWN	REFERENCES	SESSIONS_PER_USER	TIMESTAMP
	REFERENCING	SET	TIME
	REFRESH	SHARE	TO
PACKAGE	RENAME	SHARED	TOplevel
PACKED	REPLACE	SHARED_POOL	TRACE
PARALLEL	RESET	SHRINK	TRACING
PARTITION	RESETLOGS	SIZE	TRANSACTION
PASSWORD	RESIZE	SKIP	TRANSITIONAL
PASSWORD_G	RESOURCE	SKIP_UNUSABLE_INDEXES	TRIGGER
RACE_TIME	RESTRICTED	SMALLINT	TRIGGERS
PASSWORD_LI	RETURN	SNAPSHOT	TRUE
FE_TIME	RETURNING	SOME	TRUNCATE
PASSWORD_L	REUSE	SORT	TX
OCK_TIME	REVERSE	SPECIFICATION	TYPE
PASSWORD_R	REVOKE	SPLIT	
EUSE_MAX	ROLE	SQL	UB2
	ROLES	SQLBUF	UBA

PASSWORD_R	ROLLBACK	SQLCODE	UID
EUSE_TIME	ROW	SQLERROR	UNARCHIVED
PASSWORD_V	ROWID	SQLSTATE	UNDER
ERIFY_FUNCTI	ROWLABEL	SQL_TRACE	UNDO
ON	ROWNUM	STANDBY	UNION
PCTFREE	ROWS	START	UNIQUE
PCTINCREASE	RULE	STATEMENT_ID	UNLIMITED
PCTTHRESHO		STATISTICS	UNLOCK
LD	SAMPLE	STOP	UNPACKED
PCTUSED	SAVEPOINT	STORAGE	UNRECOVERABLE
PCTVERSION	SB4	STORE	UNTIL
PERCENT	SCAN_INSTANCES	STRUCTURE	UNUSABLE
PERMANENT	SCHEMA	SUCCESSFUL	UNUSED
PLAN	SCN	SUM	UPDATABLE
PLI	SCOPE	SWITCH	UPDATE
PLSQL_DEBUG	SD_ALL	SYS_OP_ENFORCE_NOT_NUL	USAGE
POST_TRANSA	SD_INHIBIT	L\$	USE
CTION	VALUE	SYSDATE	WORK
PRECISION	VALUES	SYSDBA	WRITE
PRESERVE	VARCHAR	SYSOPER	
PRIMARY	VARCHAR2	VIEW WHEN	XID
PRIOR	VARYING		
PRIVATE		WHENEVER	
PRIVATE_SGA		WHERE WITH	
PRIVILEGE		WITHOUT	
PRIVILEGES			
PROCEDURE			
PROFILE			
PUBLIC			
PURGE			
USER			
USING			
VALIDATE			
VALIDATION			

Appendix G. National Park Service GIS data specifications

GIS (Geographic Information System) Data Specifications for Resource Mapping, Inventories, and Studies

National GIS and Inventory & Monitoring Programs
National Park Service

Summary

Resource Management (RM) and Inventory and Monitoring (I&M) projects and activities generate both spatial and tabular data sets. These data sets will be incorporated into park, regional, and national databases and made available to a wide range of users. In order for this to occur effectively, certain standards and product specifications must be followed. This document provides general standards for spatial data collection and submission. Park-, network-, region-, and program-level project managers may require further specifications and must approve any deviation from these standards.

Deliverables

Complete and verified data will be delivered via CD-ROM (preferred) and/or by software compressed (zipped) file. All digital and hardcopy information that is part of the project must be delivered, including GIS data, reports, metadata, photos, and other supporting materials. Each CD should be in CD-R format, so that once it is written it cannot be modified. The CD should be in ISO 9660 format to allow cross-platform use (this requires 8.3 file names). The products delivered to the project manager will contain the following items:

Required

- Descriptive Document
- Spatial data
- Associated data table(s) or relational Microsoft Access Database*
- FGDC-compliant Metadata

As Specified

- ArcView* 3.x Legend (.AVL file)
- GIS Theme Manager Theme Lists
- Linked document(s)
- Linked graphics or digital photographs

Descriptive Document

A Microsoft Word document (and/or ASCII text file if specified) describing the data set will accompany any submission and provide all necessary information for understanding the submittal. This includes but is not limited to the following:

- Contents of the CD or .zip file
- Version and data of the data
- Sensitive data issues (if any exist)
- Concise summary of accuracy assessment procedures applied
- Recommended "official" theme name (or file name alias)
- Contact information for those responsible for the data
- Data dictionary for all attribute and database tables (e.g., listed by table in "field name", "data type", "data width", "field description" tabular format)
- Linking fields (to documents, Microsoft Access database, digital photographs)
- Viewing scale thresholds (if applicable)

The following example of a Descriptive Document for a park with alpha code "CODE" can be used as a template.

CODE_BirdSurvey_Readme.Doc (or .Txt)

A CD-R in ISO 9660 format contains the following file:

CODEBird.Zip containing the following files:

- *CODE_BirdSurvey_Readme.Doc* (this Descriptive Document)
- *CODE_Bird_File_Names.Doc* (naming convention or codes used for file names - if applicable)
- *CODE_BirdSurvey2000.Doc* – a descriptive document for the *Code* 2000 bird survey.
- *CODEBird.e00* – exported ArcINFO Coverage
- *CODEBird.avl* – ArcView 3x legend file
- *CODEBird.txt/.html/.sgml* – FGDC metadata formats
- *CODEBird.mdb* – Microsoft Access database
- *CODE_Bird_Data_Dict.Doc*

This first version of bird data was completed on 05/28/02.

None of the data contained in this data set is considered sensitive.

Features were marked in the field on 1:24,000 paper maps and digitized using a tablet. Digitized spatial data were plotted and compared to the original maps. Digitized points fell within 0.1 inches of the original marked points.

An appropriate Theme name for this data should contain Bird Survey and the year (2000) like – “Bird Survey 2000”

The data were created by Joe Smith of the National Park Service, Some NPS Project, phone – (999) 999-9999.

The data dictionary for attribute and data tables are included in the file *CODE_Bird_Data_Dict.Doc*

The Key Field “LocationID” links the Access database and the coverage.

No viewing scale thresholds are required for this data.

Spatial Data

There are several ways in which spatial data can be represented in a GIS including points, lines, polygons, or rasters/images (or geodatabases that are not recommended for contracted data development or general distribution). Determining which representation(s) is appropriate for your study involves consideration of scale and study goals. Prior to data collection, this issue should be addressed and resolved in the project study plan in consultation with the project or data manager. Additionally, network and park data management plans may dictate the appropriate format.

Naming Conventions

A clear and meaningful file name should be used that conveys the nature of the data, subject, and park unit represented. All data and related file names should adhere to 8.3 naming

standards and not contain spaces or special characters. Field names should be 10 characters or less to conform to dBase and ArcINFO field naming limitations. Microsoft Word documents may use long file names for clarity of document content.

Coordinate Systems

All spatial data collected or submitted for national, regional, or network NPS programs shall be geo-referenced and provided in the standard regional-scale projection(s) noted below. Park-scale digital geospatial data should be referenced to two coordinate systems--the current standard system used by the individual park (generally UTM, NAD83) and a regional-scale system (generally Geographic, NAD83). The steps used to get the data into the proper projection must be documented in the metadata. The project manager must specify and approve any deviation from these projection standards.

NPS-wide and Regional Data Standard (one copy) The standard projection for most NPS regions and national programs is geographic with the following parameters:

• Datum	North American Datum 1983
• Spheroid	GRS 1980
• Units	Decimal degrees

Park Unit Data Standard (one copy) In general, the standard projection for most park-level GIS layers is Universal Transverse Mercator with the following parameters:

• Projection	Universal Transverse Mercator
• Datum	North American Datum 1983
• Spheroid	GRS 1980
• False Easting	500,000
• False Northing	0
• Units	Meters

Park Unit Standards for Exceptions In addition to the systems noted above, several NPS units require additional specific standards for data delivery (e.g., Cabrillo and Craters of the Moon National Monuments and Sequoia and Kings Canyon National Parks). If the park crosses UTM zone boundaries, it is recommended that only one zone, or a different coordinate system, should be used. Parks in Hawaii and other Pacific islands will be in the datum and projection specified by each park. Because of their unique geographic location, the NPS Alaska Region also requires a specific datum and projection as noted below.

Data Formats

All vector data will be supplied as an ArcINFO coverage, ArcINFO interchange file (*.E00) and/or ArcView Shapefile, compatible with the current version of ArcINFO. All raster data will be supplied as an ArcINFO GRID and ArcINFO interchange file, compatible with the current version of ArcINFO. In general, all digital imagery, such as scanned aerial photographs, is to be supplied as tagged image file format (.TIFF) files with the proper header file (or world file) for geo-referencing purposes. If special circumstances exist (such as large image files), other spatial data formats may be acceptable. If not specified directly in the contract or project proposal, the data format(s) should be clearly stipulated and agreed upon with contractors or cooperators before data collection and processing start. If there are questions about choosing a

data format, converting between formats, or non-standard formats, contact the park, network, region, or program GIS/data managers.

After the data are produced, any specified ArcView legends and/or NPS GIS Theme Manager theme list files (see <http://www.nature.nps.gov/im/apps/thmmgr/index.htm>) should be developed and included with the project deliverables. Brief reviews of current spatial data formats are listed below.

ESRI ArcINFO Coverage Data developed in ArcINFO coverage format should be exported to an .E00 file (ArcGIS 8.x .E00 files should include the metadata .XML file from ArcCatalog). All coverages should be created as double precision data sets. If the data set was originally obtained in single precision, convert it to double precision before submitting. Well-defined projection properties of the coverage are mandatory.

ESRI ArcView Shapefile Shapefile format shall be used only when an ArcINFO coverage does not exist. The shapefile format includes at a minimum the .SHP, .DBF, and .SHX files (ArcGIS .SHP files should include the metadata .XML file from ArcCatalog). A .PRJ (projection definition) file is required unless specified otherwise in the contract or project proposal.

AutoCAD file with world file or .DXF export Generally, this format is NOT recommended and will be accepted only upon the direct specification, approval, and documentation of the project and data managers. If used, an AutoCAD release 14 (release 2000 for ArcGIS 8.x) or lower drawing (.DWG) file with a georeferenced world file (.WLD) and/or AutoCAD release 13 .DXF format file with georeferenced coordinates should be required. Note that some AutoCAD features such as X references, splines, etc. may not be available in ESRI products.

ArcINFO GRID File This is the preferred format for raster data and particularly useful for images that contain attributes other than cell values. Generally, GRID themes should be delivered as .E00 files as stipulated above. However, for large raster data sets, ESRI recommends sharing GRID files as separate workspaces because .E00 files may be extremely large and unwieldy.

GeoTIFF v1.0 A raster format with geo-referencing stored in the header of the file.

.TIFF with world file TIFF files shall be geo-referenced and include the world file (.TFW).

ERDAS Imagine file Imagine files shall be geo-referenced. Pyramid files (.RRD) shall be included if available.

Other possible raster file formats that may be utilized natively as an ArcView theme include .BMP, .BSQ, .BIL, .BIP, ERMapper, IMPELL Bitmaps, Image Catalogs, .JPEG, MrSID, and Sun Rasterfiles, but applicable header or world files must be used (which makes .BMP, .JPEG, and Sun Rasterfiles unacceptable). Again, the appropriate project manager(s) must approve any deviation from the preferred standards discussed above.

Collection methods

Several approaches to capturing digital data can be employed including digitizing features from maps or aerial photographs, and GPS (Global Positioning System) collection. The appropriate method should be determined in the study plan and after consultation with the project, resource, or data manager. Criteria for acceptable GPS coordinates should be based on the National

Park Service GPS Data Collection Guidelines at
<http://www.nature.nps.gov/im/gis/standards.htm>.

When digitizing features from maps or photographs, the source, scale, date, and methods (i.e., process steps) shall be recorded in the Metadata and discussed in the Descriptive Document. When using GPS collection, the GPS unit type, averaging method, post processing and other criteria shall be recorded in the Metadata and discussed in the Descriptive Document.

Scale and Spatial Resolution

Vector Data New data should be compiled with an accuracy level better than U.S. National Map Accuracy Standards for a 1:24,000 product unless other requirements exist (e.g., larger, more-detailed or smaller, regional-scale data). Project planners should contact appropriate GIS or data management staff for specific scale and spatial resolution requirements for vector data, which should be clearly specified in the contract or cooperative agreement.

Digital Image Data and Aerial Photography Specific scale and spatial resolution requirements for image data should be specified in the contract or cooperative agreement, or the contractor should contact the project manager for clarification. For vegetation classification under the NPS/USGS vegetation classification and mapping program, the current recommendation is 1:12,000 color infrared aerial photographs with 60% overlap (endlap) and 30% sidelap.

Horizontal and Vertical Accuracy

All spatial data collected shall be analyzed for their spatial accuracy and shall meet or exceed the National Map Accuracy Standards for the appropriate scale (for more information see <http://mapping.usgs.gov/standards/>). Decimal-degree Longitude and Latitude coordinates for geographic data should be recorded to a minimum 5 significant digits to the right of the decimal point and stored in double precision attribute or database fields. Any calculations done with location data should be done at double precision with the results rounded or truncated to the appropriate propagated error limits. All calculations and processing completed on the spatial data shall be reported in the metadata.

For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000 or smaller, 1/50 inch. These limits of accuracy shall apply to positions of well-defined points only. Well-defined points are those that are easily visible or recoverable on the ground: monuments or markers, such as benchmarks and property boundary monuments; intersections of roads and railroads; and corners of large buildings or structures (or center points of small buildings). In general, what is well defined will also be determined by what is plot-able on the scale of the map within 1/100 inch. Thus, while the intersection of two roads or property lines meeting at right angles would come within a sensible interpretation, identification of the intersection of such lines meeting at an acute angle would not be practicable within 1/100 inch...

Vertical accuracy, as applied to contour maps on all publication scales, shall be such that not more than 10 percent of the elevations tested shall be in error by more than one-half the contour interval. In checking elevations taken from the map, the apparent vertical error may be decreased by assuming a horizontal displacement within the permissible horizontal error for a map of that scale. (USGS Fact Sheet 078-96, 1997)

The following table provides the allowable horizontal accuracy for some common scales:

Scale	Allowable Error	Scale	Allowable Error
• 1:40,000	33.8 meters (111 feet)	• 1:9,600	4.9 meters (16 feet)
• 1:31,680	16.1 meters (53 feet)	• 1:4,800	2.4 meters (8 feet)
• 1:24,000	12.2 meters (40 feet)	• 1:2,400	1.2 meters (4 feet)
• 1:20,000	10.1 meters (33 feet)	• 1:1,200	0.6 meters (2 feet)
• 1:12,000	6.1 meters (20 feet)		

Attribute Data

By their nature resource inventories and studies will generate complex data sets. All fields within the database supporting GIS layers should have names of 10 characters or less due to ArcView and dBase limitations. Because the ArcINFO coverage/shapefile format is not ideal for storage and management of complex relational data, relational attribute data shall be stored in a separate, well-structured relational database system. Map features and database records shall share a common unique identifier or primary key that relates a map feature to a table record.

Primary Key

The Natural Resource Database Template is a Microsoft Access database that contains the core table "tblLocations" that contains the primary key field "LocationID". GIS data are required to also contain a field, "LocationID," and be formatted the same as in the Database Template (type = Character, length = 255). The values of LocationID must be unique and less than 255 characters in length and should be consistent (perhaps based on sampling strategy). Actual value domains should be specified in the study plan or after consultation with the park, network, region, or program GIS/data manager(s).

For more information and the data dictionary describing the Natural Resource Database Template see <http://www1.nature.nps.gov/im/apps/template/index.htm>.

Other attribute fields may be included in the GIS feature attribute table if integral to rendering symbology. These fields will be duplicates of the Microsoft Access data with fields formatted and values consistent with the database fields, and should be refreshed before final delivery of the data set. Any such fields included in the GIS feature attribute table will be detailed in the Descriptive Document.

Attribute Accuracy

Every theme may have different attribute data requirements. In general, attribute data entry and quality control should follow good data management practices including verification of precise data entry and validation of possible domain values. All attribute accuracy assessments and corrective actions will be detailed in the Descriptive Document. Contractors or cooperators should consult with the park, network, region, or program GIS/data manager(s) if guidance is needed about good data management practices.

Quality Control

Accuracy assessments of spatial and attribute data should include creation of check plots with spatial features labeled. The Descriptive Document will include the accuracy assessment method(s) performed and scale at which the data were collected. Results of tests used to verify all applicable horizontal, vertical and attribute accuracy measurements will be provided when data are delivered.

When the contractor has completed 10% of the spatial and attribute data development, the contractor must supply the data to the project manager for quality control purposes. The data must be delivered in conformance with the spatial data format requirements. Once the park, project, and GIS staff have checked the data and found it acceptable, the contractor may continue data development. Once the contractor has completed the work, the project manager must determine that the spatial data, attribute data, and Federal Geographic Data Committee (FGDC) compliant metadata are acceptable before the job is considered complete.

For each map feature, the estimated horizontal error in meters shall be recorded in the database field "EstHError." Estimated horizontal error is a calculation of the error range associated with a location. The required Federal reporting standard is the radius of a circle of uncertainty, such that the true or theoretical location of the point falls within that circle 95% of the time. For digitized features, the horizontal error is determined by the source map scale and digitizing precision. For GPS locations, most units provide an estimate of positional accuracy that can be used to estimate the horizontal error. An optional field describing the data source for each feature may also be included.

Metadata

All spatial data submitted shall include metadata that meets the minimum content standard for digital geo-spatial metadata (FGDC metadata; see <http://geology.usgs.gov/tools/metadata/>). (Project managers should request metadata exceeding the minimum requirements, e.g., the Biological Profile whenever appropriate.) The metadata must be parsed with no errors prior to submission using the Metadata Parser (MP) provided by the FDGC. The metadata should be delivered in FGDC-standard formatted ASCII text with a .TXT extension, hypertext markup language with an .HTML extension, and standard general markup language with an .SGML extension (<http://geology.usgs.gov/tools/metadata/>).

Specifications for the attributes and database tables attached or linked to the spatial data must be documented in the "Attribute Entity" section of the FGDC metadata and include:

- Field name
- Field description
- Field format
- Valid values

The Descriptive Document should also include a more easily readable, tabular-formatted data dictionary with the attribute and database tables specifications. The data dictionary should be listed by table and include the field name, field format, field width, and field description with valid values. An entity and relationship diagram should be included for relational tables if applicable.

Several example FGDC-compliant metadata records and browse graphics may be reviewed at http://www.nps.gov/gis/sample_data.htm for reference. To learn more about getting started with FGDC metadata or using the MetaParser program see <http://geology.usgs.gov/tools/metadata/> or contact your project or data manager. For complete information on FGDC metadata see www.fgdc.gov.

Note: Experienced metadata developers should estimate 4 hours per theme layer for metadata development. If the developer is unfamiliar with FGDC metadata development and guidelines, estimate an additional 20 hours for learning the process.

Legend

If project deliverables include thematic map displays, the corresponding symbology shall be included as an ArcView 3.x legend file (.AVL). Additionally, fields integral to symbolization must be present in the delivered GIS feature attributes. The Descriptive Document shall include a description of the thematic display and the fields required for rendering symbols.

Linked Documents

Project documents such as user manuals and detailed descriptions can be linked to map features through "hot linking". Hot linking (hyperlinking) allows the user to click a map feature and have a related document open and jump to the chapter associated with an attribute of that map feature. If an associated document is included with the intention of hot linking (hyperlinking) the following is required:

Microsoft Word Documents (for conversion to Windows Help Files)

- The document(s) shall be a Microsoft Word formatted file.
- The document(s) will include a table of contents with separate listings for each "topic" or description that relates to a GIS feature (e.g., extensive textual descriptions of each and every feature of a theme).
- Include a separate tabular list of which "topics" correspond to each linking field value in the GIS theme (i.e. the key values for linking the document to the GIS).

HTML Documents

- The document(s) shall be an HTML formatted file.
- The document(s) will include a table of contents with separate listings and anchors for each "topic" or description that relates to a GIS feature.
- Include a separate tabular list of which "topics" correspond to each linking field value in the GIS theme (i.e. the key values for linking the document to the GIS).

For more information about linking documents to GIS features, see the NPS Theme Manager helpfile "Advanced Theme List Parameters" topic at <http://www.nature.nps.gov/im/apps/thmmgr/index.htm>.

Linked Graphics or Digital Photographs

If any linked digital photographs are included with the data set, they should be in a format that is readable in ESRI ArcView 3.x. Image types that can be directly hot linked (hyperlinked) to a theme in ArcView's Avenue scripting language include .GIF, .JPEG/.JPG, MacPaint, Microsoft DIB, Sun Raster files, .TIFF, .TIFF/LZW compressed, X-Bitmap, and .XWD. In addition, web browsers and the NPS Graphics Viewer also allow the use of linked .GIF, .JPEG/.JPG, and .BMP formats (see <http://www.nature.nps.gov/im/apps/thmmgr/index.htm>) that do not display well, including large graphic images that are problematic in ArcView 3.x.

Images and graphics shall be organized in a file folder or directory structure that provides a logical hierarchical format. The directory structure recommended by the national I&M Program may be downloaded at <http://www.nature.nps.gov/im/gis/standards.htm>.

Map features with linked graphics/photographs should contain a GIS attribute field that records the absolute directory path and file name (multiple images should be separated by commas). The suggested field name is "Images." Map layers should have meaningful names that relate to the map theme and its attributes, and digital image file names should be encoded with this value. Any file coding schemes that are used should be documented and included in the Descriptive Document.

Appendix H. NCPN specifications for using global positioning systems

The National Park Service

Inventory & Monitoring

NORTHERN COLORADO PLATEAU NETWORK

GPS Field Data Collection Guide

Version 1.1

September, 2005

Introduction

Over the past decade new tools have been developed to help researchers collect and manipulate data while in the field. Global Positioning System (GPS) is one such tool. GPS is currently a constellation of 28 Department of Defense satellites orbiting 11,000 miles above the Earth approximately every 12 hours, emitting signals to Earth at precisely the same time. The position and time information transmitted by these satellites is used by a GPS receiver to triangulate a location coordinate on the earth using three or more satellites.

This guide supplements the National Park Service *Field Data Collection with Global Positioning Systems Standard Operating Procedures and Guidelines*, 02/10/2004. (http://www.nps.gov/gis/data_info/standards.html) Readers should be familiar with and follow both sets of guidelines, as well as individual project specifications or protocols that may contain additional detailed procedures. Users must also be familiar with the operation of their particular GPS unit before entering the field to collect data or navigate to points.

This guide addresses GPS instruments, instrument settings, field operation, data collection, data processing, and a standardized method for acquiring and managing location data. It contains the procedures and considerations that GPS users should follow when collecting geospatial data or navigating to locations in Northern Colorado Plateau Network (NCPN) parks.

Types of GPS units

There are three major types of GPS units that are based on the level of accuracy to which spatial data can be collected. Survey-grade GPS units are used for surveying tasks that require very high accuracy (1 cm or less). Mapping-grade units can map features from sub-meter to less than 5-meter accuracy, employing differential correction. Recreational-grade GPS units are sold primarily for outdoor sports and recreational activities. Accuracy using recreational GPS units ranges from 5 – 30 meters. Most natural resource-related data collection requirements correspond to either the recreational-grade

or mapping-grade. Figure 1 shows some of the major differences between these two types.

Deciding which type of unit to use is an essential part of project planning, and depends on the end product needed. NCPN encourages the use of the mapping-grade GPS units; however, for some projects recreational-grade units can meet a project's accuracy requirements. The choice of GPS unit should be made by the project leader after consulting with the NCPN GIS technician and data manager.

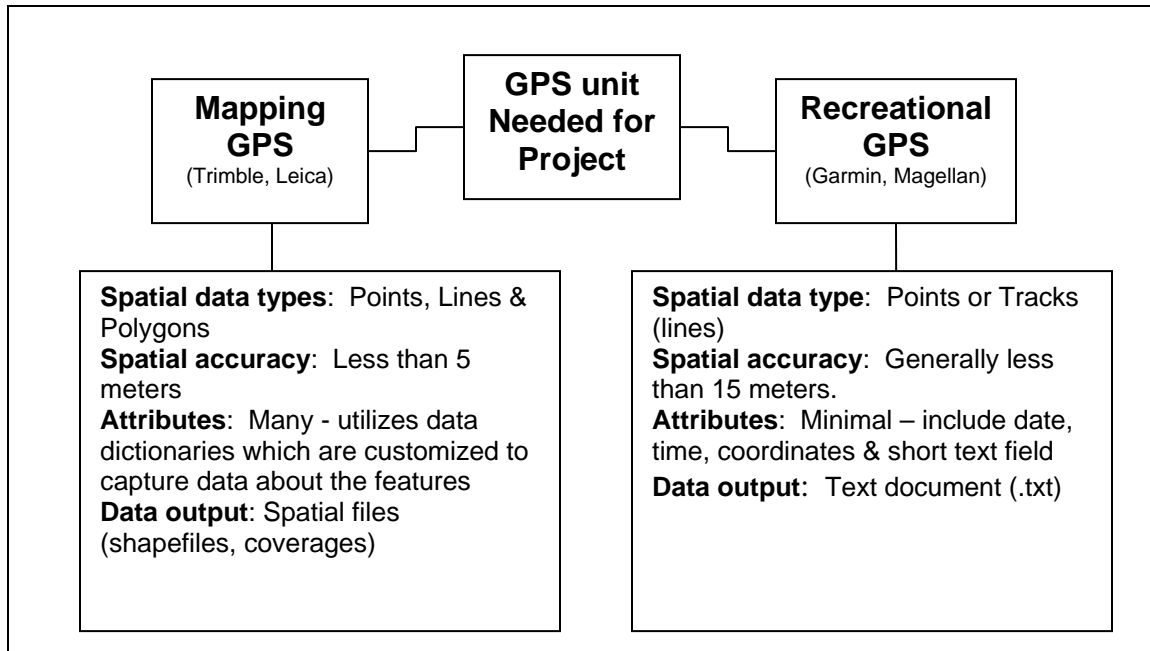


Figure 1. Differences between different grades of GPS units

All resulting GIS data layers need to meet or exceed the National Map Accuracy Standards for a 1:24,000 product (NPS GIS Data Standards, 2002 http://www.nps.gov/gis/data_info/standards.html). Table 1 provides the allowable horizontal accuracy for some common scales.

Table 1. Map scales and allowable error

Scale	Allowable Error	Scale	Allowable Error
1:40,000	33.8 meters (111 feet)	1:9,600	4.9 meters (16 feet)
1:31,680	16.1 meters (53 feet)	1:4,800	2.4 meters (8 feet)
1:24,000	12.2 meters (40 feet)	1:2,400	1.2 meters (4 feet)
1:20,000	10.1 meters (33 feet)	1:1,200	0.6 meters (2 feet)
1:12,000	6.1 meters (20 feet)		

Mapping-grade GPS

Mapping-grade GPS units provide the user with a variety of tools for field data collection. NCPN encourages the use of these units for most projects. These units can acquire spatial data related to points, lines and polygons along with associated tabular attributes. Careful forethought and advanced planning are required to take advantage of these capabilities long before data collection begins.

Data dictionaries

Mapping-grade GPS units have the capability of using data dictionaries. Data dictionaries store attribute information about the feature being mapped and are customized for each project. The NCPN GIS technician should be directly involved in the creation of data dictionaries. Basic steps include:

1. Identify the features to be mapped. These features are real world physical locations of objects which are categorized as point, line or polygon features.
2. Identify the data to be collected about each feature while in the field and create a data dictionary. Part of this process is assigning a unique identifier to each feature. (For example, if a survey plot is mapped as both a point and a polygon, one feature should be named plotname_poly and the other plotname_pt.)
3. Implement and test the data dictionary. NPCN recommends a complete trial run for newly-created data dictionaries before beginning field work. Corrections and refinements are inevitable after such a trial.

GPS settings

Positional accuracy can be affected by several factors which mapping-grade GPS units can track and to some extent, compensate for. Table 2 lists these functions, their definitions, and the standard settings. All spatial data collected shall be analyzed for spatial accuracy and shall meet or exceed the National Map Accuracy Standards (see <http://mapping.usgs.gov/standards/>). Table 3 indicates the coordinate system settings for data collection.

Table 2. Minimum GPS Receiver Settings Standards

Name	Definition	Standard
Almanac	GPS unit collects data containing estimated position of satellites, time corrections, and atmospheric delay parameters.	Acquired within 10 days prior to data collection or navigating.
Altitude reference	Ellipsoid model	Height above Ellipsoid (HAE) [preferred] or Mean Sea Level (MSL); if MSL is used, indicate Geoid Model
Antenna heights	GPS unit height above the ground.	1.0 – 2.0 meters
Datum	Geodetic model designed to fit a point on the earth's surface to the ellipsoid.	NAD 83

Name	Definition	Standard
Elevation mask	The minimum angle at which a GPS receiver will track satellite vehicles.	15 degrees
Feature types	The physical location and geometry of spatial data.	point, line, area (polygon)
Logging intervals	Time interval between positions gathered.	Point: 1 second, Line and Polygon: 5 seconds
Minimum number of positions for a point feature	Number of positions received then averaged to create a point feature.	10 - 20
Mode	2-Dimensional or 3-Dimensional	3-Dimensional (4 satellites)
PDOP Mask	Positional Dilution of Precision is a measurement of the geometry of the satellites.	6.0 or less
Satellite vehicles	Number of satellites, currently a constellation of 28 DOD satellites.	4
SNR Mask	Signal-to-Noise Ratio is a measure of the strength of the satellite signal relative to background noise.	4.0 minimum, 6.0 or greater preferred
Unit of Measure	Units of measure.	Meters

Table 3. Coordinate settings for Northern Colorado Plateau Network parks

Park	UTM Zone	Datum
ARCH	12	NAD 1983 (Conus)
BLCA	13	NAD 1983 (Conus)
BRCA	12	NAD 1983 (Conus)
CANY	12	NAD 1983 (Conus)
CARE	12	NAD 1983 (Conus)
CEBR	12	NAD 1983 (Conus)
COLM	12	NAD 1983 (Conus)
CURE	13	NAD 1983 (Conus)
DINO	12	NAD 1983 (Conus)
FOBU	12	NAD 1983 (Conus)
GOSP	12	NAD 1983 (Conus)
HOVE	12	NAD 1983 (Conus)
NABR	12	NAD 1983 (Conus)
PISP	12	NAD 1983 (Conus)
TICA	12	NAD 1983 (Conus)
ZION	12	NAD 1983 (Conus)

Before beginning data collection, the NCPN GIS technician needs to provide the most current almanac available. The almanac is a set of data that is used to predict the timing and path of satellite orbits over approximately a one-month period, which is then used to determine if or when satellite reception could hamper data collection.

If navigation to preset waypoints is applicable to a project, waypoints must be loaded onto the GPS unit before departure to the field. NCPN also recommends having printed topographic maps of the waypoint locations to maximize field time and efficiently navigate between waypoints.

Many mapping-grade GPS units have the capability of storing and displaying background maps or layers, which can be very helpful when navigating in the field. The NCPN GIS technician can help identify and load these layers onto a unit before field work begins.

GPS units create files to store data during a field session using a prefix and date-time stamp as file names:

RMMDDHHx

R – Unit prefix

MM – Month

DD – Day

HH – Hour

X – a, b, c, etc. order of files created in an hour.

If multiple GPS units are used on a project, a unique prefix (letter) should be assigned to each unit, which will ensure that downloaded files for each unit contain a unique identifier within the filename. For example, with three GPS units, the unique letters for the units could be N, G, and A. Those letters would serve as a prefix for the file names (e.g., N102715A, G102715A and A102715A would indicate units N, G, and A, October, 27, 15 hour, A first in hour).

Each user should be familiar with the data capacity of their GPS unit. All units have limited battery and memory resources, and a balance needs to be reached that will allow the most efficient use of these resources.

Data Collection

Data collection is accomplished by using the data dictionary customized for a project. Users should keep in mind the following key concepts:

- If using a GPS unit that gives an approximate 5 meter horizontal (XY) accuracy, the user cannot map anything as a polygon that is less than 4-6 meters in width. The object must be captured as a point feature.
- If a GPS user is collecting a line or polygon feature and then stops moving, the GPS unit will continue to collect data (Figure 2, ex. 1 and 2). Users need to be familiar with the *Pause/Resume* toggle key and use it liberally.
- Another way to avoid errors is to collect point features that represent the beginning and end points of a line transect (Figure 2). Having these reference point locations will mean easier editing of any zig-zagging line features.

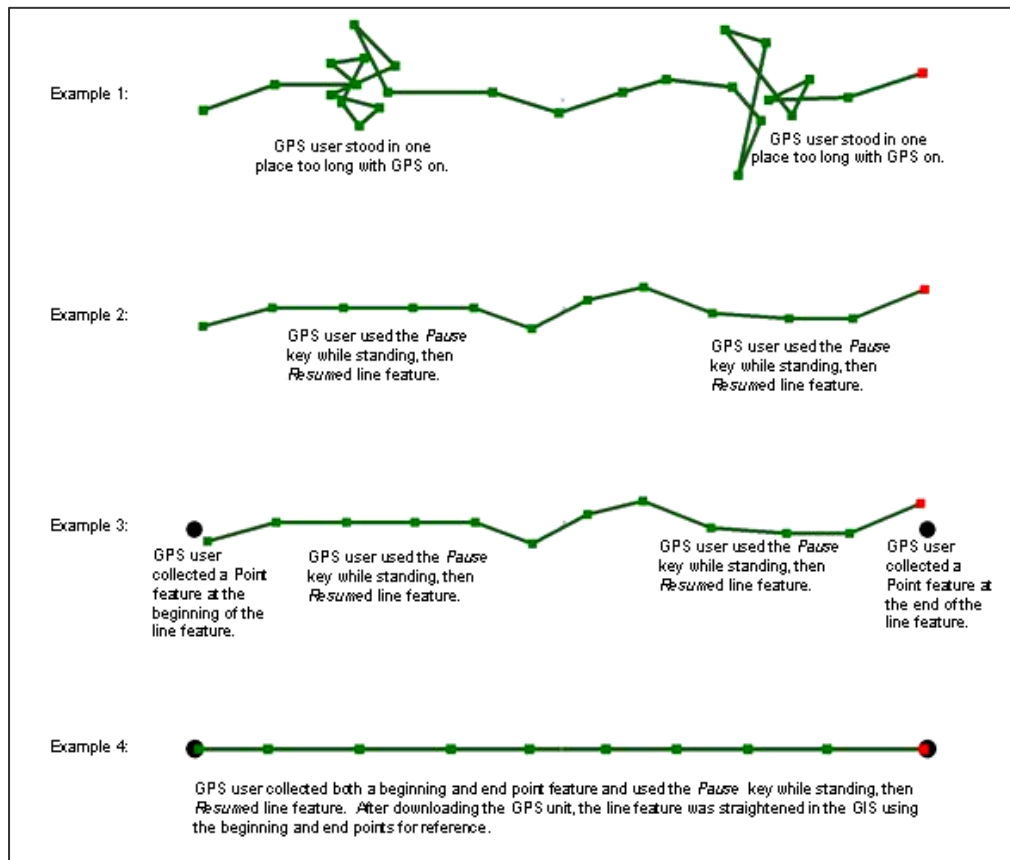


Figure 2. Examples of GPS point feature data collection

Mapping-grade GPS units have additional features that aid in data collection. These include:

- *Nested Features* – Allows user to collect a point while collecting a line or polygon feature. For example, while surveying potential amphibian habitat along a stream (line feature), the user can pause the line feature, take a point a specific observation, then resume the line feature collection.
- *Offset Feature* – Allows user to collect a feature when topography is such that getting next to or over the feature is impossible. For example, a GPS point could be collected for a hanging garden while standing to the side of the actual garden.
- *Between-feature Positions* – the GPS unit collects positions without any feature or attribute data. This feature is useful for tracking areas traveled during a day. For example, while surveying for presence or absence of invasive plants, a user could collect data on the area surveyed in addition to specific plants found.

Data Processing:

When data collection is complete for the day or field stint, data are downloaded from the GPS unit to a computer. For Trimble GPS units, the proprietary software Pathfinder Office is used to download, differentially correct and then export the data to a GIS format. Differential correction is a post processing procedure to improve upon raw GPS positions using base station data. Base stations consist of a GPS antenna and receiver positioned at a known location specifically to collect data from satellites. The distance between the base station and the remote GPS receiver should be kept to a minimum, preferably less than 150 miles.

Once the data are differentially corrected, they can be verified and edited. Unintentional features can be deleted and attributes can be reviewed. The last step is exporting the data set to GIS (ArcGIS or ArcView). Additional data elements can be included in the data exports. Data elements recommended by NCPN are listed in Table 4.

Table 4. Recommended fields to be exported in addition to GPS features

All Features	Point Features	Line Features	Area Features
PDOP	Height	Length (2D)	Area (2D)
Correction Status	Position	Length (3D)	Perimeter (2D)
Receiver Type			Perimeter (3D)
Date Recorded			
Data file name			
Total positions			
Data Dictionary name			

Managing the incoming GPS data can be a challenge, especially if there are multiple units per project. Common practices used by NCPN include:

- Download all data to a computer that is regularly backed up.
- Keep GPS data and GIS data separate
- Directories and files names should not contain non-alpha-numeric characters and/or spaces.
- Keep incoming GPS data in well-organized and identified directories (Figure 3).

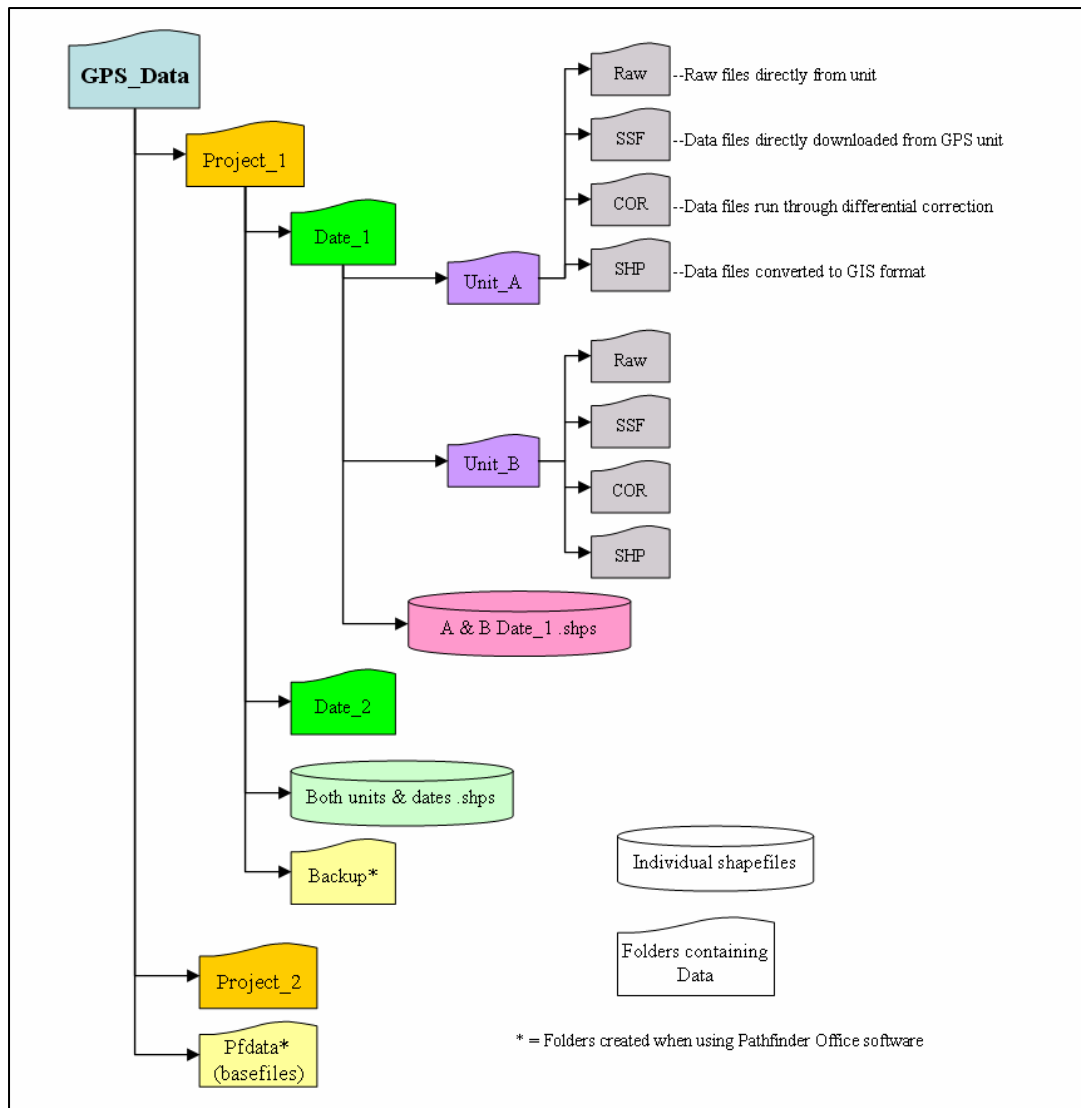


Figure 3. Suggested directory structure for GPS data and resulting GIS files

At the end of a project, all data and background files should be removed from the GPS unit. Data files should not be left on a unit if they have been properly downloaded and verified.

Additional information can be found at <http://www.nps.gov/gis/gps/gps4gis/>, which describes the steps outlined here in greater detail.

Recreational-grade GPS

Recreational-grade GPS units can be used to acquire location information (generally points) when spatial accuracy is not paramount to the project. Recreational GPS units do not have data dictionaries for storing attribute information with the point location.

Planning

If a recreational-grade GPS meets the criteria of the project, the unit chosen must have the capability of downloading collected data to a personal computer. This is usually accomplished with a parallel or USB cable connection.

Much of the data collected by GPS will eventually reside in a relational database. Each GPS feature collected should contain a unique identifier that relates the feature to an associated record in a database. Since recreational GPS units have only one text field for input, careful consideration should be given to the use of this field and the design of unique identifiers. NCPN data and GIS staff can assist in creating unique IDs on a project by project basis.

Data Collection

Location data are captured by recreational-grade GPS units as *waypoints*. When taking a waypoint, enter the Location ID in the text field provided. NCPN also recommends that reference points be collected every so often. These reference point positions should be taken at known locations (e.g., trailheads, parking lots, stream confluences) which can later be used in GIS to QC the accuracy of waypoint data.

If navigation to preset waypoints is applicable to a project, they must be loaded onto the GPS unit before departure to the field. NCPN also recommends having printed topographic maps of the waypoint locations to maximize field time and efficiently navigate between waypoints.

Data Processing

GPS units should be downloaded once a day or after each field session. NCPN suggests each file name include the download date. The downloaded data should then be converted to a spatial file and projected to UTM NAD83. Figure 3 shows a suggested directory structure for downloaded data. Points should be checked for reasonable spatial accuracy and errors and all subsequent downloads should be error-checked in the same manner. When data collection is finished, all files should be compiled into one spatial file to be submitted along with all raw downloads to the Northern Colorado Plateau Network.

Metadata

Regardless of the type of GPS unit used to collect data, all resulting GIS datasets need to have information documenting how the GPS data were collected. NPS requires that FGDC (Federal Geographic Data Committee, www.fgdc.gov/index.html) compliant metadata be written for all geospatial layers created (Executive Order 12906).

Until final FGDC metadata is written, there isn't a standardized method for project documentation. Tracking GPS projects depends on the complexity of the project, how many participants, length of project etc. Documentation can be a simple readme text file, or a detailed daily log.

The NCPN recommends formal metadata be written by the data collectors as they are the ones familiar with the project and resulting data. However, GIS staff are usually the ones documenting someone else's work. At a minimum, the following details should be documented to facilitate final FGDC metadata:

- Name of project
- Name(s) of data collectors
- EHE/EPE or maximum PDOP (using 4 satellites)
- Coordinate system (projection, datum & zone)
- Type (or types) of GPS units used
- The range of field collection dates
- Name of Base Station used for correction
- Name and version of software used for downloading and any corrections
- Any editing performed on the raw data
- All versions of data dictionaries should be saved

Definitions

Accuracy - The degree of conformance between the estimated or measured position, time, and/or velocity of a GPS receiver and its true time, position, and/or velocity as compared with a constant standard.

Almanac -Data transmitted by a GPS satellite, which include orbit information on all the satellites, clock correction, and atmospheric delay parameters. The almanac is used to facilitate rapid SV acquisition. The orbit information is a subset of the ephemeris data with reduced precision.

Attribute – Tabular information about a specific feature.

Base Station - GPS files collected continuous from community base stations, local base stations, or Continually operating Stations (CORS). Gather base files will require an internet connection and software that dials into a server that houses the base station data collected at the same time of the rover. Data stored on these servers will not be available in real-time - hence this step is conducted after field collection. Trimble users would use the Differential Correction utility supplied in Pathfinder Office.

Differential correction - The merging of rover file data with base map data to correct position errors due to atmospheric interference. Autonomous data (rover) are collected in the field while base data are stored at the stationary base station. The two datasets are loaded into a post-processing software package where corrections are applied. This process will reduce errors in the field collected data (the rover) by correlating and correcting for known errors recorded in the base file that has the same time tag. As distance between the rover and base file increase, there is degradation in post-processed accuracy. In general, a degradation of one part per million (1ppm) occurs as the distance between the base station and rover increases. For example, one millimeter of degradation occurs for every kilometer between base and rover.

Datum (*geodetic datum*) – A mathematical model that is designed to fit a point on the earth's surface to an ellipsoid. Commonly used datums are North American Datum (NAD) 1927, and NAD 1983, modeled to represent the North American continent.

Feature - A feature is the spatial location of a physical object, or some event or phenomenon. Features are often referred to as graphic data in a GIS. Examples include a tree (point), road (line), or land parcel (polygon).

FGDC - The Federal Geographic Data Committee is a 19 member interagency committee composed of representatives from the Executive Office of the President, Cabinet-level and independent agencies who develop policies, standards, and procedures for organizations to cooperatively produce and share geographic data.
(www.fgdc.gov/index.html)

Global Positioning Systems (GPS) – a constellation of a minimum of twenty-four satellite vehicles orbiting the earth approximately every twelve hours at an approximate pacing of sixty degrees, between 11,000 – 12,000 miles above the surface of the Earth

Lines – geographic term related to the scale that describe how a feature is drawn. Lines are linear measures of a feature (such as a line representing a trail)

Mapping grade – GPS receivers capable of attaining five meters of accuracy or better using differential correction.

Metadata - Data about the data. Usually comes in the form of a text or html document with information on the dataset's quality, current projection, attributes, distribution and citation. In the National Park Service, this generally implies a file compliant to the FGDC Content Standard for Digital Geospatial Metadata.

Multipath – error which occurs when a GPS signal sent from a satellite vehicle is bounced or redirected by an object, prior to reaching a GPS receiver. Multipath will cause the time it takes a GPS signal sent by a satellite vehicle to reach a GPS receiver to be inflated. This will cause inaccuracies in positions collected.

Points – geographic term related to the scale that describe how a feature is drawn. Points are single dimensional features (such as a point representing a spring).

Polygons - geographic term related to the scale that describe how a feature is drawn. Polygons have area associated with the feature (such as a circle representing a parking lot).

Projection - A method of representing the earth's three-dimensional surface as a flat two-dimensional surface. This normally involves a mathematical model that transforms the locations of features on the earth's surface to locations on a two-dimensional surface.

Post processing – utilizing base station data, GPS software, and data acquired by a GPS receiver in the field to gain an accurate fixed position.

Triangulation - The process of determining the distance between points on the earth's surface by dividing up a large area into a series of connected triangles, measuring a base line between two points, and then locating a third point by computing both the size of the angles made by lines from this point to each end of the base line and the lengths of these lines.

Waypoint – a named 3 dimensional position on the earth's surface, that is, having both a latitude and longitude. Waypoints are assigned to a fixed location in the field so it can be navigated to consistently and accurately through time.

Appendix I. Summary of NCPN data resources

1. NPSPpecies - status of inventory and certification

FISH		
Park	Inventory Status	Certification Status
ARCH	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
BLCA	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
BRCA	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
CANY	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
CARE	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
CEBR	N/A	N/A
COLM	N/A	N/A
CURE	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
DINO	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.
FOBU	N/A	N/A
GOSP	N/A	N/A
HOVE	N/A	N/A
NABR	N/A	N/A
PISP	N/A	N/A
TICA	N/A	N/A
ZION	Existing inventory data from the literature being analyzed by NPS regional fishery biologist.	Pending, Sept 2005.

AMPHIBIANS		
Park	Inventory Status	Certification Status
ARCH	Single year, USGS inventory conducted in 2002.	Completed March 2004.
BLCA	Single year inventory conducted in 2004 by G. Hammerson. Final report due Jan 2005.	Completed August 2005.
BRCA	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
CANY	NCPN review of existing park data.	Completed March 2004.
CARE	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
CEBR	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
COLM	Single year, USGS inventory conducted in 2002.	Completed March 2004.

CURE	Single year inventory conducted in 2004 by G. Hammerson. Final report due Jan 2005.	Completed August 2005.
DINO	NCPN review of existing park data.	Completed March 2004.
FOBU	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
GOSP	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
HOVE	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
NABR	Single year, USGS inventory conducted in 2002.	Completed March 2004.
PISP	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
TICA	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
ZION	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.

REPTILES		
Park	Inventory Status	Certification Status
ARCH	Single year, USGS inventory conducted in 2002.	Completed March 2004.
BLCA	Single year inventory conducted in 2004 by G. Hammerson. Final report due Jan 2005.	Completed August 2005.
BRCA	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
CANY	None, used in-house data.	Completed March 2004.
CARE	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
CEBR	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
COLM	Single year, USGS inventory conducted in 2002.	Completed March 2004.
CURE	Single year inventory conducted in 2004 by G. Hammerson. Final report due Jan 2005.	Completed August 2005.
DINO	None, used in-house data.	Completed March 2004.
FOBU	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
GOSP	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
HOVE	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
NABR	Single year, USGS inventory conducted in 2002.	Completed March 2004.
PISP	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
TICA	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.
ZION	Two year, USGS inventory conducted 2001-2002.	Completed March 2004.

BIRDS		
Park	Inventory Status	Certification Status
ARCH	NCPN review of existing park data.	Pending, Dec 2005.

BLCA	Two year, RMBO inventory conducted 2002-2003.	Completed, Jan 2005.
BRCA	NCPN review of existing park data.	Pending, Feb 2006.
CANY	NCPN review of existing park data.	Pending, Dec 2005.
CARE	NCPN review of existing park data.	Pending, Feb 2006.
CEBR	Two year, USGS inventory conducted 2001-2002.	Pending, Oct 2005.
COLM	Two year, RMBO inventory conducted 2002-2003.	Completed, Dec 2004.
CURE	Two year, RMBO inventory conducted 2002-2003.	Completed, Jan 2005.
DINO	Two year, RMBO inventory conducted 2001-2002.	Completed, Dec 2004.
FOBU	Two year, USGS inventory conducted 2001-2002.	Pending, Oct 2005.
GOSP	Two year, USGS inventory conducted 2001-2002.	Pending, Oct 2005.
HOVE	NCPN review of existing park data.	Pending, Dec 2005.
NABR	NCPN review of existing park data.	Pending, Dec 2005.
PISP	NCPN review of existing park data.	Pending, Feb 2006.
TICA	Two year, USGS inventory conducted 2001-2002.	Pending, Oct 2005.
ZION	NCPN review of existing park data.	Pending, Feb 2006.

MAMMALS		
Park	Inventory Status	Certification Status
ARCH	NCPN review of existing park data.	Completed, July 2005.
BLCA	Two year, USGS inventory conducted 2001-2002.	Completed, Aug 2005.
BRCA	NCPN review of existing park data.	Completed, Aug 2005.
CANY	NCPN review of existing park data. Two year bat inventory in progress, 2004-2005.	Completed, July 2005, with some modifications from bat inventory final results, Jan 2006.
CARE	Two year, USGS inventory conducted 2001-2002.	Completed, July 2005.
CEBR	Two year, USGS inventory conducted 2001-2002.	Pending, August 2005.
COLM	NCPN review of existing park data.	Pending, August 2005.
CURE	Two year, USGS inventory conducted 2001-2002.	Completed, Aug 2005.
DINO	NCPN review of existing park data.	Pending, August 2005.
FOBU	Two year, USGS inventory conducted 2001-2002.	Pending, August 2005.
GOSP	Two year, USGS inventory conducted 2001-2002.	Completed, Aug 2005.
HOVE	Two year, USGS inventory conducted 2001-2002.	Completed, July 2005.
NABR	NCPN review of existing park data.	Completed, July 2005.
PISP	Two year, USGS inventory conducted 2001-2002.	Pending, August 2005.
TICA	Two year, USGS inventory conducted 2001-2002.	Completed, Aug 2005.
ZION	NCPN review of existing park data.	Pending, August 2005.

VASCULAR PLANTS			
Park	Inventory Status	Herbaria Review	Certification Status
ARCH	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
BLCA	Two year, Univ. Colorado inventory conducted 2002-2003.	On-site review and specimen annotation by Dr. Mike Hogan, CU, in 2003.	Pending, Sep 2005.
BRCA	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Oct 2005.
CANY	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
CARE	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2004.	Pending, Sep 2005.
CEBR	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
COLM	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Feb 2006.
CURE	Two year, Univ. Colorado inventory conducted 2002-2003.	On-site review and specimen annotation by Dr. Mike Hogan, CU, in 2003.	Pending, Sep 2005.
DINO	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Feb 2006.
FOBU	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2004.	Pending, Sep 2005.
GOSP	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Feb 2006.
HOVE	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
NABR	NCPN review of existing park data.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
PISP	NCPN review of existing park data.	On-site review and specimen annotation by Jason Alexander, Oregon State Univ, in 2004.	Pending, Sep 2005.
TICA	Vascular plant data collected and assembled by Dr. Duane Atwood, BYU, in 2001.	On-site review and specimen annotation by Walt Fertig, in 2005.	Pending, Dec 2005.
ZION	NCPN review of existing park data.	On-site review and specimen annotation by Jason Alexander, Oregon State Univ, 2003-2004.	Pending, Sep 2005.

Appendix I. Summary of NCPN data resources

2. Summary of NCPN GIS Inventory

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Unknown
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Complete
ARCH	Archaeology	No	No	SEUG Data	Unknown
ARCH	Boundaries	No	No	SEUG Data	Complete
ARCH	Boundaries	No	No	SEUG Data	Complete
ARCH	Boundaries	No	No	SEUG Data	Complete
ARCH	Boundaries	No	No	SEUG Data	Complete
ARCH	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Buildings	No	Yes	R:\GIS\	Complete
ARCH	Buildings	No	Yes	SEUG Data	Complete
ARCH	DEM	No	Yes	C:\workspace\gis_data\	Complete
ARCH	DEM	Yes	No	C:\workspace\gis_data\	Complete
ARCH	DEM	No	Yes	G:/GIS/Data/	Complete
ARCH	DEM	No	Yes	G:/GIS/Data/	Complete
ARCH	DOQQ	Yes	No	CDs @ SEUG	Complete
ARCH	DOQQs Color	No	Yes	G:/GIS/Data/	Complete
ARCH	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	DRG	Yes	No	G:/GIS/Data/	Complete
ARCH	DRG	Yes	No	C:\workspace\gis_data\	Complete
ARCH	DRG	Yes	No	G:/GIS/Data/	Complete
ARCH	DRG	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Fences	No	Yes	G:/GIS/Data/Parks/	Incomplete
ARCH	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Fire	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Geology	Yes	No	G:/GIS/Data/	Complete
ARCH	Geology	No	No	G:/GIS/Data/Parks/	Incomplete
ARCH	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
ARCH	Hydro	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
ARCH	Hydro	Yes	No	SEUG Data	Complete
ARCH	Hydro, seeps-springs-tinajas etc	Yes	No	G:/GIS/Data/Parks/	Work in progress
ARCH	Hydro, seeps-springs-tinajas etc	No	Yes	SEUG Data	Incomplete
ARCH	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Unknown
ARCH	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Unknown
ARCH	Imagery	No	No	G:/GIS/Imagery	Complete
ARCH	Imagery	No	No	G:/GIS/Imagery	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
ARCH	Imagery	No	No	G:/GIS/Imagery	Complete
ARCH	Imagery	No	No	G:/GIS/Imagery	Complete
ARCH	Mines	No	No	SEUG Data	Complete
ARCH	Misc	No	No	SEUG Data	
ARCH	Monitoring, air quality	No	Yes		Incomplete
ARCH	Monitoring, other	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, other	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, other	Yes	No	G:/GIS/Data/	Complete
ARCH	Monitoring, other	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, sound	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, vegetation	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, vertebrates	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, water quality	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, water quality	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Monitoring, water quality	Yes	No	SEUG Data	Complete
ARCH	Ownership	No	Yes		Not applicable
ARCH	Parking lots	No	Yes	C:\workspace\gis_data\	Complete
ARCH	Parking Lots	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Parking Lots	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Parking Lots	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Plants, TES	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Plants, TES	No	No	SEUG Data	Work in progress
ARCH	Plants, TES	No	Yes	SEUG Data	Complete
ARCH	Pullouts	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Roads	Yes	No	SEUG Data	Complete
ARCH	Roads	Yes	No	SEUG Data	Complete
ARCH	Roads	No	Yes	SEUG Data	Complete
ARCH	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Signs	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Signs	No	No	SEUG Data	Work in progress
ARCH	Signs	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Signs	No	No	SEUG Data	Work in progress

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
ARCH	Signs	No	No	SEUG Data	Complete
ARCH	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Survey data	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Topography	No	Yes	SEUG Data	Complete
ARCH	Topography	No	Yes	SEUG Data	Complete
ARCH	Trails	No	Yes	G:/GIS/Data/	Complete
ARCH	Trails	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Trails	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	Yes	SEUG Data	Incomplete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Utilities	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Utilities	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	Yes	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Utilities	No	No	SEUG Data	Complete
ARCH	Vegetation, general	Yes	No	SEUG Data	Complete
ARCH	Vegetation, general	Yes	No		Work in progress
ARCH	Vertebrates, general	Yes	No	G:/GIS/Data/Parks/	Complete
ARCH	Vertebrates, TES	Yes	No	C:/workspace/gis_data/	Work in progress
ARCH	Vertebrates, TES	No	No	G:/GIS/	Complete
ARCH	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
ARCH	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
ARCH	Weather data	No	No	G:/GIS/Data/Parks/	Complete
ARCH	Wilderness	No	Yes	G:/GIS/	Complete
AZ	Boundaries	No	No	C:/workspace/gis_data/	Complete
AZ	Boundaries	No	No	C:/workspace/gis_data/	Complete
AZ	Ownership	No	Yes	C:/workspace/gis_data/	Complete
BLCA	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	Buildings	No	Yes	G:/GIS/Data/Parks/	Work in progress
BLCA	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	DOQQ	Yes	No	BLCA	Complete
BLCA	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	DRG	No	No	G:/GIS/Data/Parks/	Complete
BLCA	DRG	No	No	G:/GIS/Data/Parks/	Complete
BLCA	Fire	No	Yes		No spatial file
BLCA	Geology	Yes	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Hydro	No	Yes	C:/workspace/gis_data/parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
BLCA	Hydro	No	Yes	G:/GIS/Data/Parks/	Work in progress
BLCA	Hydro	No	No	G:/GIS/Data/Parks/	Complete
BLCA	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Work in progress
BLCA	Hydro, seeps-springs-tinajas etc	No	Yes		
BLCA	Imagery	No	No	G:/GIS/Imagery	Complete
BLCA	Imagery	No	No	G:/GIS/Imagery	Complete
BLCA	Imagery	No	No	G:/GIS/Imagery	Complete
BLCA	Misc	No	No	BLCA	Work in progress
BLCA	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Misc	No	No	BLCA	Incomplete
BLCA	Misc	No	No	G:/GIS/Data/Parks/	Unknown
BLCA	Misc	No	No	BLCA	Work in progress
BLCA	Monitoring, air quality	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	Monitoring, sound	No	Yes		
BLCA	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
BLCA	Ownership	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Plants, exotic/invasive	Yes	No		Work in progress
BLCA	Plants, TES	No	Yes		
BLCA	Pullouts	No	Yes		
BLCA	Roads	Yes	No	C:/workspace/gis_data/parks/	Complete
BLCA	Roads	No	No	G:/GIS/Data/Parks/	Complete
BLCA	Signs	No	No	G:/GIS/Data/Parks/	Complete
BLCA	Trails	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA	Utilities	No	Yes	G:/GIS/Data/Parks/	Unknown
BLCA	Utilities	No	No	G:/GIS/Data/Parks/	Unknown
BLCA	Utilities	No	Yes	G:/GIS/Data/Parks/	Unknown
BLCA	Vegetation, mapped and classified	No	Yes		Work in progress
BLCA	Vertebrates, general	No	Yes	BLCA	Complete
BLCA	Vertebrates, general	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA	Vertebrates, TES	No	Yes		
BLCA	Water bodies	No	No	G:/GIS/Data/Parks/	Incomplete
BLCA	Weather data	No	No	G:/GIS/Data/Parks/	Complete
BLCA	Weather data	Yes	No		
BLCA	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA/CURE	Archaeology	No	No	BLCA	Complete
BLCA/CURE	Bridges	No	No	BLCA	Incomplete
BLCA/CURE	Grazing	No	No	BLCA	Unknown
BLCA/CURE	Misc	No	No	BLCA	Work in progress
BLCA/CURE	Misc	No	Yes	BLCA	Complete
BLCA/CURE	Monitoring, vegetation	No	No	BLCA	Unknown
BLCA/CURE	Monitoring, vegetation	Yes	No	BLCA	Complete
BLCA/CURE	Monitoring, vegetation	No	No	BLCA	Complete
BLCA/CURE	Monitoring, vertebrates	No	Yes	BLCA	Complete
BLCA/CURE	Ownership	No	Yes	BLCA	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
BLCA/CURE	Ownership	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
BLCA/CURE	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
BLCA/CURE	Soils	Yes	No	BLCA	Incomplete
BLCA/CURE	Soils	Yes	No	BLCA	Incomplete
BLCA/CURE	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA/CURE	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
BLCA/CURE	Utilities	No	No	G:/GIS/Data/Parks/	Complete
BLCA/CURE	Utilities	No	Yes	BLCA	Incomplete
BLCA/CURE	Vegetation, general	Yes	No	BLCA	Work in progress
BLCA/CURE	Vertebrates, general	No	Yes	BLCA	Complete
BLCA/CURE	Vertebrates, general	Yes	No	BLCA	Work in progress
BRCA	Archaeology	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Archaeology	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
BRCA	Buildings	No	Yes	G:/GIS/Data/Parks/	Work in progress
BRCA	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	DOQQs Color	No	Yes	G:/GIS/Data/	Complete
BRCA	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
BRCA	DRG	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Fences	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Geology	Yes	No	G:/GIS/Data/	Complete
BRCA	Grazing	No	Yes		Incomplete
BRCA	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
BRCA	Hydro	No	No	http://www.nps.gov/gis	Complete
BRCA	Hydro	No	Yes	C:\workspace\gis_data\	Not applicable
BRCA	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Work in progress
BRCA	Hydro, seeps-springs-tinajas etc	No	Yes	C:\workspace\gis_data	Work in progress
BRCA	Hydro, seeps-springs-tinajas etc	No	Yes		Incomplete
BRCA	Misc	No	No	C:\workspace\gis_data\	Complete
BRCA	Monitoring, air quality	Yes	No	BRCA	Incomplete
BRCA	Monitoring, other	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Monitoring, sound	No	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
BRCA	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Ownership	No	Yes		Incomplete
BRCA	Parking lots	No	Yes		Work in progress
BRCA	Plants, exotic/invasive	No	Yes	BRCA	Unknown
BRCA	Plants, exotic/invasive	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Plants, TES	No	Yes	BRCA	Work in progress
BRCA	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Pullouts	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Roads	Yes	No	C:\workspace\gis_data\	Unknown
BRCA	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
BRCA	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
BRCA	Topography	No	Yes		
BRCA	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Trails	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Transportation	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	Yes	No	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Utilities	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
BRCA	Vegetation, mapped and classified	Yes	No		Work in progress
BRCA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, TES	No	No	G:/GIS/Data/Parks/	Complete
BRCA	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
BRCA	Water bodies	No	Yes		Not applicable
BRCA	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
BRCA	Weather data	Yes	No		Incomplete
BRCA	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Archaeology	No	No	SEUG Data	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CANY	Archaeology	No	No	SEUG Data	Complete
CANY	Archaeology	No	No	SEUG Data	Unknown
CANY	Archaeology	No	No	SEUG Data	Unknown
CANY	Archaeology	No	No	SEUG Data	Unknown
CANY	Archaeology	No	No	SEUG Data	Unknown
CANY	Archaeology	No	No	SEUG Data	Complete
CANY	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Boundaries	No	No	SEUG Data	Complete
CANY	Boundaries	No	No	SEUG Data	Complete
CANY	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
CANY	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
CANY	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
CANY	Boundaries	No	No	SEUG Data	Complete
CANY	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Boundaries	No	No	C:\workspace\gis_data\	Complete
CANY	Boundaries	No	No	SEUG Data	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	C:\workspace\gis_data\	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Buildings	No	Yes	C:\workspace\gis_data\	Complete
CANY	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Buildings	No	Yes	SEUG Data	Complete
CANY	Campsites	No	Yes	SEUG Data	Complete
CANY	Campsites	No	Yes	SEUG Data	Complete
CANY	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	DEM	No	No	SEUG Data	Complete
CANY	DEM	No	No	SEUG Data	Complete
CANY	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	DEM	No	Yes	SEUG Data	Complete
CANY	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	DEM	No	No	SEUG Data	Complete
CANY	DOQQ	Yes	No	CDs @ SEUG	Complete
CANY	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	DRG	No	No	SEUG Data	Complete
CANY	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Fences	No	Yes		Incomplete
CANY	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Fire	No	Yes	SEUG Data	Complete
CANY	Fire	No	Yes	SEUG Data	Complete
CANY	Fire	No	Yes	SEUG Data	Complete
CANY	Fire	No	Yes	SEUG Data	Complete
CANY	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Geology	Yes	No	G:/GIS/Data/	Complete
CANY	Hydro	Yes	No	SEUG Data	Complete
CANY	Hydro	No	Yes	G:/GIS/Data/Parks/	Work in progress
CANY	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Hydro	No	Yes		Not applicable
CANY	Hydro	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Hydro	No	No	SEUG Data	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CANY	Hydro	No	Yes	SEUG Data	Complete
CANY	Hydro	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Hydro, seeps-springs-tinajas etc	No	Yes		Incomplete
CANY	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Hydro, seeps-springs-tinajas etc	No	Yes	SEUG Data	Work in progress
CANY	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Work in progress
CANY	Hydro, seeps-springs-tinajas etc	No	Yes	SEUG Data	Incomplete
CANY	Imagery	No	Yes	G:/GIS/	Complete
CANY	Mines	No	No	G:/GIS/Data/Parks/	Complete
CANY	Mines	No	No	G:/GIS/Data/Parks/	Complete
CANY	Misc	No	Yes	SEUG Data	Complete
CANY	Misc	No	No	SEUG Data	Complete
CANY	Misc	No	No	SEUG Data	Complete
CANY	Monitoring, air quality	No	Yes		Incomplete
CANY	Monitoring, climate/weather	No	Yes		Incomplete
CANY	Monitoring, other	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, other	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, other	Yes	No	G:/GIS/Ummmmm/	Complete
CANY	Monitoring, vegetation	No	No	SEUG Data	Unknown
CANY	Monitoring, vegetation	No	No	SEUG Data	Complete
CANY	Monitoring, vegetation	No	No	SEUG Data	Complete
CANY	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, vegetation	No	No	SEUG Data	Complete
CANY	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, vertebrates	No	No	G:/GIS/Workspace/	Work in progress
CANY	Monitoring, vertebrates	No	No	G:/GIS/Data/Parks/	Complete
CANY	Monitoring, water quality	Yes	No	G:/GIS/Data/Parks/	Complete
CANY	Ownership	No	Yes		Not applicable
CANY	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Parking lots	No	Yes	SEUG Data	Complete
CANY	Parking lots	No	Yes	SEUG Data	Complete
CANY	Plants, exotic/invasive	No	Yes	G:/GIS/Data/Parks/	Work in progress
CANY	Plants, exotic/invasive	No	Yes	SEUG Data	Complete
CANY	Plants, TES	No	Yes		Incomplete
CANY	PLSS	No	No	SEUG Data	Complete
CANY	Pullouts	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Roads	Yes	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CANY	Roads	Yes	No	SEUG Data	Complete
CANY	Roads	No	No	G:/GIS/Data/Parks/	Complete
CANY	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Signs	No	No	G:/GIS/Data/Parks/	Complete
CANY	Signs	No	No	G:/GIS/Data/Parks/	Complete
CANY	Soils	Yes	No	G:/GIS/Data/Parks/	Work in progress
CANY	Soils	Yes	No	SEUG Data	Complete
CANY	Soils	No	No	G:/GIS/Data/Parks/	Complete
CANY	Topography	No	Yes	R:\GIS\	Complete
CANY	Topography, DEM	No	No	SEUG Data	Complete
CANY	Topography, DEM	No	No	SEUG Data	Complete
CANY	Topography, DEM	No	No	SEUG Data	Complete
CANY	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	No	SEUG Data	Complete
CANY	Utilities	No	No	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	No	G:/GIS/Data/Parks/	Work in progress
CANY	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	Yes	SEUG Data	Complete
CANY	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	No	SEUG Data	Complete
CANY	Utilities	No	Yes	SEUG Data	Complete
CANY	Utilities	No	Yes	SEUG Data	Complete
CANY	Utilities	No	Yes	SEUG Data	Complete
CANY	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Utilities	No	Yes	SEUG Data	Complete
CANY	Vegetation, general	Yes	No	R:\GIS\	Complete
CANY	Vegetation, mapped and classified	No	Yes		Work in progress
CANY	Vertebrates, general	No	No	SEUG Data	Unknown
CANY	Vertebrates, TES	Yes	No	SEUG Data	Work in progress
CANY	Vertebrates, TES	No	No	G:/GIS/	Complete
CANY	Vertebrates, TES	Yes	No	SEUG Data	Work in progress
CANY	Vertebrates, TES	No	Yes	SEUG Data	Work in progress
CANY	Vertebrates, TES	No	Yes	SEUG Data	Unknown
CANY	Vertebrates, TES	No	Yes	SEUG Data	Complete
CANY	Vertebrates, TES	Yes	No	SEUG Data	Complete
CANY	Vertebrates, TES	No	Yes	SEUG Data	Unknown
CANY	Vertebrates, TES	Yes	No	SEUG Data	Work in progress
CANY	Water bodies	No	Yes	G:/GIS/Data/Parks/	Work in progress
CANY	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
CANY	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
CARE	Boundaries	No	No	C:\workspace\gis_data\parks/	Complete
CARE	Boundaries	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Buildings	No	No	G:/GIS/Data/Parks/	Complete
CARE	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	DOQQ	Yes	No	C:\workspace\gis_data\	Complete
CARE	DOQQs Color	No	Yes	G:/GIS/Data/	Complete
CARE	DRG	No	No	C:\workspace\gis_data\	Complete
CARE	DRG	Yes	No	C:\workspace\gis_data\	Complete
CARE	DRG	Yes	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CARE	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CARE	Fences	No	Yes	C:\workspace\gis_data\	Complete
CARE	Fire	No	Yes		Unknown
CARE	Geology	Yes	No	C:\workspace\gis_data\	Complete
CARE	Geology	Yes	No	C:\workspace\gis_data\	Complete
CARE	Geology	Yes	No	C:\workspace\gis_data\	Complete
CARE	Geology	Yes	No	G:/GIS/Data/Parks/	Complete
CARE	Grazing	No	Yes	G:/GIS/Data/Parks/	Unknown
CARE	Hydro	No	Yes	G:/GIS/Data/Parks/	Work in progress
CARE	Hydro	Yes	No	C:\workspace\gis_data\	Complete
CARE	Hydro	Yes	No	C:\workspace\gis_data\	Complete
CARE	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Incomplete
CARE	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Work in progress
CARE	Hydro, seeps-springs-tinajas etc	No	Yes		
CARE	Monitoring, air quality	Yes	No	G:/GIS/Data/Parks/	Complete
CARE	Monitoring, other	No	No		Complete
CARE	Monitoring, sound	No	Yes		Unknown
CARE	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
CARE	Ownership	No	Yes		
CARE	Paleo	No	No	C:\workspace\gis_data\parks/	Unknown
CARE	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Plants, exotic/invasive	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Plants, TES	No	Yes	C:\workspace\gis_data\parks/	Complete
CARE	Pullouts	No	Yes	C:\workspace\gis_data\	Complete
CARE	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
CARE	Roads	No	No	C:\workspace\gis_data\parks/	Complete
CARE	Soils	Yes	No	G:/GIS/Data/Parks/	Work in progress
CARE	Topography	No	Yes		Incomplete
CARE	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Utilities	No	Yes	C:\workspace\gis_data\parks/	Complete
CARE	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
CARE	Vegetation, general	Yes	No	C:\workspace\gis_data\	Incomplete
CARE	Vegetation, mapped and classified	No	Yes		Work in progress
CARE	Vertebrates, general	No	No	C:\workspace\gis_data\parks/	Unknown
CARE	Vertebrates, general	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Vertebrates, general	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Vertebrates, TES	No	Yes	C:\workspace\gis_data\	Complete
CARE	Water bodies	No	Yes	G:/GIS/Data/Parks/	Work in progress
CARE	Weather data	Yes	No		
CARE	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
CARE	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
CEBR	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	DEM	Yes	No	C:\workspace\gis_data\	Complete
CEBR	DEM	No	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CEBR	DEM	Yes	No	C:\workspace\gis_data\	Complete
CEBR	DEM	No	No	G:/GIS/Data/Parks/	Complete
CEBR	DOQQ	No	Yes	CDs @ SEUG	Complete
CEBR	DOQQs Color	Yes	No	G:/GIS/Data/Parks/	Complete
CEBR	DRG	No	No	G:/GIS/Data/Parks/	Complete
CEBR	DRG	Yes	No	C:\workspace\gis_data\	Complete
CEBR	DRG	No	No	C:\workspace\gis_data\	Complete
CEBR	Fences	No	Yes		
CEBR	Fire	No	Yes		
CEBR	Geology	Yes	No	G:/GIS/Data/Parks/	Complete
CEBR	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
CEBR	Hydro	Yes	No	C:\workspace\gis_data\	Complete
CEBR	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Work in progress
CEBR	Hydro, seeps-springs-tinajas etc	No	Yes		
CEBR	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Unknown
CEBR	Hydro, seeps-springs-tinajas etc	No	Yes	C:\workspace\gis_data\	Complete
CEBR	Misc	No	No	C:\workspace\gis_data\	Complete
CEBR	Monitoring, air quality	Yes	No		
CEBR	Monitoring, sound	No	Yes		
CEBR	Monitoring, water quality	No	Yes	C:\workspace\gis_data\	Complete
CEBR	Ownership	No	No	G:/GIS/Data/Parks/	Complete
CEBR	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	Plants, exotic/invasive	No	Yes		
CEBR	Plants, TES	No	Yes		
CEBR	Pullouts	No	Yes		
CEBR	Roads	No	Yes	C:\workspace\gis_data\	Complete
CEBR	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
CEBR	Soils	Yes	No		
CEBR	Topography	No	Yes		
CEBR	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
CEBR	Utilities	No	Yes		
CEBR	Vegetation, mapped and classified	Yes	No		Work in progress
CEBR	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
CEBR	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
CEBR	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
CEBR	Vertebrates, TES	No	Yes		
CEBR	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
CEBR	Weather data	Yes	No		
CEBR	Weather data	No	No	G:/GIS/Data/Parks/	Complete
CEBR	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
CO	Boundaries	No	No	C:\workspace\gis_data\	Complete
CO	Boundaries	No	No	C:\workspace\gis_data\	Complete
CO	Boundaries	No	No	C:\workspace\gis_data\	Complete
CO	Ownership	No	Yes	C:\workspace\gis_data\	Complete
CO	Ownership	No	Yes	C:\workspace\gis_data\	Complete
CO	Roads	No	No	SEUG Data	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
COLM	Boundaries	No	No	C:\workspace\gis_data\	Complete
COLM	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	Boundaries	No	No	C:\workspace\gis_data\	Complete
COLM	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	DEM	Yes	No	C:\workspace\gis_data\	Complete
COLM	DEM	No	No	G:/GIS/Data/Parks/	Incomplete
COLM	DEM	Yes	No	G:/GIS/Data/Parks/	Incomplete
COLM	DOQQ	Yes	No	C:\workspace\gis_data\	Complete
COLM	DOQQs Color	No	Yes	G:/GIS/Data/	Complete
COLM	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	DRG	No	No	C:\workspace\gis_data\	Complete
COLM	Fences	No	No	G:/GIS/Data/Parks/	Complete
COLM	Fences	No	No	G:/GIS/Data/Parks/	Complete
COLM	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Fire	No	No	G:/GIS/Data/Parks/	Complete
COLM	Fire	No	No	G:/GIS/Data/Parks/	Complete
COLM	Geology	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	Hydro	No	No	G:/GIS/Data/Parks/	Complete
COLM	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
COLM	Hydro	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Work in progress
COLM	Hydro, seeps-springs-tinajas etc	No	Yes		
COLM	Hydro, seeps-springs-tinajas etc	No	Yes		
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	C:\workspace\gis_data\	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Misc	No	No	G:/GIS/Data/Parks/	Complete
COLM	Monitoring, air quality	Yes	No		
COLM	Monitoring, sound	No	Yes		
COLM	Monitoring, vegetation	Yes	No	C:\workspace\gis_data\	Complete
COLM	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
COLM	Parking lots	No	Yes		
COLM	Plants, exotic/invasive	No	Yes	C:\workspace\gis_data\	Complete
COLM	Plants, TES	No	Yes	G:/GIS/Data/Parks/	Work in progress
COLM	Pullouts	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Roads	No	No	C:\workspace\gis_data\	Complete
COLM	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
COLM	Signs	No	No	G:/GIS/Data/Parks/	Complete
COLM	Signs	No	No	G:/GIS/Data/Parks/	Complete
COLM	Signs	No	No	G:/GIS/Data/Parks/	Complete
COLM	Signs	No	No	G:/GIS/Data/Parks/	Complete
COLM	Soils	Yes	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
COLM	Topography	No	Yes		
COLM	Trails	No	No	G:/GIS/Data/Parks/	Complete
COLM	Trails	No	No	C:\workspace\gis_data\	Complete
COLM	Utilities	No	No	G:/GIS/Data/Parks/	Complete
COLM	Utilities	No	No	G:/GIS/Data/Parks/	Complete
COLM	Utilities	No	No	G:/GIS/Data/Parks/	Complete
COLM	Utilities	No	No	G:/GIS/Data/Parks/	Complete
COLM	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Utilities	No	No	G:/GIS/Data/Parks/	Complete
COLM	Vegetation, general	Yes	No	C:\workspace\gis_data\	Complete
COLM	Vegetation, general	No	No	G:/GIS/Data/Parks/	Complete
COLM	Vegetation, mapped and classified	No	No		Work in progress
COLM	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
COLM	Vertebrates, TES	No	Yes		
COLM	Water bodies	No	Yes	G:/GIS/Data/Parks/	Work in progress
COLM	Weather data	No	No	G:/GIS/Data/Parks/	Complete
COLM	Weather data	No	Yes		
COLM	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
COLM	Wilderness	No	Yes	C:\workspace\gis_data\	Complete
COLM	Wilderness	No	Yes	C:\workspace\gis_data\	Complete
CURE	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
CURE	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	Bridges	No	No	G:/GIS/Data/Parks/	Complete
CURE	Buildings	No	No	G:/GIS/Data/Parks/	Complete
CURE	Buildings	No	No	G:/GIS/Data/Parks/	Complete
CURE	Buildings	No	No	G:/GIS/Data/Parks/	Complete
CURE	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	Campsites	No	No	G:/GIS/Data/Parks/	Complete
CURE	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	DRG	No	No	G:/GIS/Data/Parks/	Complete
CURE	Fences	No	Yes	G:/GIS/Data/Parks/	Incomplete
CURE	Fire	No	Yes		
CURE	Hydro	No	No	http://www.nps.gov/gis	Complete
CURE	Hydro	No	No	G:/GIS/Data/Parks/	Complete
CURE	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
CURE	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Incomplete
CURE	Hydro, seeps-springs-tinajas etc	No	Yes		Incomplete
CURE	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	Misc	No	Yes	BLCA	Work in progress
CURE	Misc	No	No	BLCA	Complete
CURE	Misc	No	No	G:/GIS/Data/Parks/	Incomplete
CURE	Misc	No	No	BLCA	Complete
CURE	Misc	No	No	BLCA	Complete
CURE	Misc	No	No	G:/GIS/Data/Parks/	Complete
CURE	Misc	No	No	C:\workspace\gis_data\	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
CURE	Monitoring, air quality	Yes	No		
CURE	Monitoring, sound	No	Yes		
CURE	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
CURE	Ownership	No	Yes		
CURE	Paleo	No	No	BLCA	Complete
CURE	Parking lots	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
CURE	Plants, exotic/invasive	No	Yes	BLCA	Complete
CURE	Plants, TES	No	Yes		No spatial file
CURE	Pullouts	No	Yes	BLCA	Complete
CURE	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
CURE	Signs	No	No	G:/GIS/Data/Parks/	Unknown
CURE	Trails	No	No	BLCA	Work in progress
CURE	Trails	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	Transportation	No	No	G:/GIS/Data/Parks/	Complete
CURE	Transportation	Yes	No	BLCA	Work in progress
CURE	Utilities	No	No	G:/GIS/Data/Parks/	Unknown
CURE	Utilities	No	No	G:/GIS/Data/Parks/	Unknown
CURE	Utilities	No	No	G:/GIS/Data/Parks/	Unknown
CURE	Utilities	No	Yes	BLCA	Complete
CURE	Vegetation, general	No	No	G:/GIS/Data/Parks/	Complete
CURE	Vegetation, mapped and classified	No	Yes		Work in progress
CURE	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
CURE	Vertebrates, TES	No	No	BLCA	Complete
CURE	Vertebrates, TES	No	Yes	BLCA	Complete
CURE	Vertebrates, TES	No	No	CURE & CDs @ NCPN	Unknown
CURE	Water bodies	Yes	No	G:/GIS/Data/Parks/	Complete
CURE	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
CURE	Weather data	Yes	No		
CURE	Weather data	No	No	G:/GIS/Data/Parks/	Complete
CURE	Wilderness	No	Yes		
DINO	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
DINO	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Buildings	No	No	G:/GIS/Data/Parks/	Complete
DINO	Buildings	No	No	G:/GIS/Data/Parks/	Complete
DINO	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	DEM	Yes	No	C:\workspace\gis_data\	Complete
DINO	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Fences	No	Yes		
DINO	Fire	No	Yes	C:\workspace\gis_data\	Complete
DINO	Geology	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Grazing	No	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
DINO	Grazing	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Hydro	Yes	No	G:/GIS/Data/Parks/	Work in progress
DINO	Hydro, seeps-springs-tinajas etc	Yes	No	G:/GIS/Data/Parks/	Work in progress
DINO	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Hydro, seeps-springs-tinajas etc	No	Yes		
DINO	Imagery	No	No	G:/GIS/Imagery	Complete
DINO	Monitoring, air quality	Yes	No		
DINO	Monitoring, sound	No	Yes		
DINO	Monitoring, water quality	Yes	No		
DINO	Ownership	No	Yes		
DINO	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Plants, exotic/invasive	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Plants, TES	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
DINO	Plants, TES	No	No	G:/GIS/Data/Parks/	Complete
DINO	Plants, TES	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Pullouts	No	Yes		
DINO	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Topography	No	Yes	http://www.nps.gov/gis	Complete
DINO	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Utilities	No	No	G:/GIS/Data/Parks/	Complete
DINO	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
DINO	Vegetation, mapped and classified	No	No	G:/GIS/Data/Parks/	Complete
DINO	Vegetation, mapped and classified	Yes	No		Work in progress
DINO	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
DINO	Vertebrates, TES	No	Yes		
DINO	Vertebrates, TES	No	No	G:/GIS/Data/Parks/	Complete
DINO	Water bodies	Yes	No	G:/GIS/Data/Parks/	Work in progress
DINO	Weather data	Yes	No		
DINO	Weather data	Yes	No	G:/GIS/Data/Parks/	Complete
DINO	Wilderness	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	DOQQ	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	DOQQs Color	No	Yes		
FOBU	DRG	No	No	G:/GIS/Data/Parks/	Complete
FOBU	DRG	Yes	No	C:\workspace\gis_data\	Complete
FOBU	DRG	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Fire	No	Yes		
FOBU	Geology	Yes	No	http://www.nps.gov/gis	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
FOBU	Geology	Yes	No	http://www.nps.gov/gis	Complete
FOBU	Geology	Yes	No	http://www.nps.gov/gis	Complete
FOBU	Geology	Yes	No	http://www.nps.gov/gis	Complete
FOBU	Geology	Yes	No	http://www.nps.gov/gis	Complete
FOBU	Geology	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Hydro	Yes	No	C:\workspace\gis_data\	Complete
FOBU	Hydro	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Hydro	Yes	No	G:/GIS/Data/Parks/	Work in progress
FOBU	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Hydro	No	Yes	G:/GIS/Data/Parks/	Work in progress
FOBU	Hydro	No	No	C:\workspace\gis_data\	Complete
FOBU	Hydro, seeps-springs-tinajas etc	Yes	No	G:/GIS/Data/Parks/	Work in progress
FOBU	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Monitoring, air quality	Yes	No		
FOBU	Monitoring, plants	No	Yes	G:/GIS/Data/Parks/	Incomplete
FOBU	Monitoring, sound	No	Yes		
FOBU	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
FOBU	Ownership	No	Yes		Not applicable
FOBU	Parking lots	No	Yes	G:/GIS/Data/Parks/	Work in progress
FOBU	Plants, exotic/invasive	No	Yes	G:/GIS/Data/Parks/	Work in progress
FOBU	Plants, TES	No	Yes	C:\workspace\gis_data\	Complete
FOBU	Plants, TES	No	Yes	C:\workspace\gis_data\	Complete
FOBU	Pullouts	No	Yes		Not collected
FOBU	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Signs	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Utilities	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
FOBU	Vegetation, mapped and classified	Yes	No	G:/GIS/Data/Parks/	Complete
FOBU	Vegetation, mapped and classified	No	Yes		Work in progress
FOBU	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Vertebrates, TES	No	Yes	C:\workspace\gis_data\	Complete
FOBU	Vertebrates, TES	No	Yes	C:\workspace\gis_data\	Complete
FOBU	Water bodies	Yes	No	G:/GIS/Data/Parks/	Work in progress
FOBU	Weather data	No	No	G:/GIS/Data/Parks/	Complete
FOBU	Weather data	Yes	No	C:\workspace\gis_data\	Complete
FOBU	Wilderness	No	Yes		
GOSP	Archaeology	No	Yes	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
GOSP	Archaeology	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
GOSP	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	Buildings	No	No	G:/GIS/Data/Parks/	Complete
GOSP	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	DEM	No	No	G:/GIS/Data/Parks/	Complete
GOSP	DEM	Yes	No	C:\workspace\gis_data\	Complete
GOSP	DOQQ	Yes	No	G:/GIS/Data/Parks/	Complete
GOSP	DOQQs Color	No	Yes		Not collected
GOSP	DRG	No	No	G:/GIS/Data/Parks/	Complete
GOSP	DRG	No	No	G:/GIS/Data/Parks/	Complete
GOSP	DRG	Yes	No	C:\workspace\gis_data\	Incomplete
GOSP	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	Fire	No	Yes		
GOSP	Geology	Yes	No		
GOSP	Grazing	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Hydro	Yes	No	C:\workspace\gis_data	Complete
GOSP	Hydro	No	No	G:/GIS/Data/Parks/	Work in progress
GOSP	Hydro, seeps-springs-tinajas etc	No	Yes	C:\workspace\gis_data	Complete
GOSP	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Work in progress
GOSP	Hydro, seeps-springs-tinajas etc	No	Yes		
GOSP	Misc	No	No	C:\workspace\gis_data\	Complete
GOSP	Misc	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Misc	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Monitoring, air quality	Yes	No		
GOSP	Monitoring, sound	No	Yes		
GOSP	Monitoring, water quality	Yes	No		
GOSP	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	Plants, exotic/invasive	No	Yes		
GOSP	Plants, TES	No	Yes		
GOSP	Pullouts	No	Yes		
GOSP	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
GOSP	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	Signs	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
GOSP	Topography	No	Yes		
GOSP	Trails	Yes	No	G:/GIS/Data/Parks/	Complete
GOSP	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
GOSP	Utilities	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Utilities	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Utilities	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Utilities	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Vegetation, mapped and classified	Yes	No		Not collected
GOSP	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
GOSP	Vertebrates, TES	No	Yes		
GOSP	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
GOSP	Weather data	Yes	No		
GOSP	Weather data	No	No	G:/GIS/Data/Parks/	Complete
GOSP	Wilderness	No	Yes		
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	Yes	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	No	SEUG Data	Complete
HOVE	Archaeology	No	Yes	SEUG Data	Unknown
HOVE	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Buildings	No	No	G:/GIS/Data/Parks/	Complete
HOVE	Buildings	No	Yes	SEUG Data	Complete
HOVE	Buildings	No	Yes	SEUG Data	Complete
HOVE	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	DEM	No	No	G:/GIS/Data/Parks/	Complete
HOVE	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	DOQQ	Yes	No	F:/	Complete
HOVE	DOQQs Color	No	Yes	F:/	Incomplete
HOVE	DRG	Yes	No	F:/	Complete
HOVE	DRG	No	No	C:\workspace\gis_data\	Complete
HOVE	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Fences	No	Yes	SEUG Data	Complete
HOVE	Fences	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Fences	No	No	SEUG Data	Complete
HOVE	Fences	No	Yes	F:/	Complete
HOVE	Fire	No	Yes		Incomplete
HOVE	Geology	Yes	No	SEUG Data	Complete
HOVE	Geology	Yes	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Hydro	Yes	No	G:/GIS/Data/Parks/	Work in progress
HOVE	Hydro, seeps-springs-tinajas etc	No	Yes	SEUG Data	Complete
HOVE	Hydro, seeps-springs-tinajas etc	No	Yes		Incomplete
HOVE	Hydro, seeps-springs-tinajas etc	Yes	No	G:/GIS/Data/Parks/	Work in progress
HOVE	Misc	No	No	SEUG Data	Complete
HOVE	Misc	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Monitoring, air quality	No	Yes		Incomplete
HOVE	Monitoring, climate/weather	No	Yes		Incomplete
HOVE	Monitoring, other	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Monitoring, other	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Monitoring, sound	No	Yes		Incomplete
HOVE	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
HOVE	Monitoring, water quality	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
HOVE	Plants, exotic/invasive	No	Yes		Incomplete
HOVE	Plants, TES	No	Yes		Incomplete
HOVE	Pullouts	No	Yes		Incomplete
HOVE	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Roads	No	Yes	C:\workspace\gis_data\	Work in progress
HOVE	Signs	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Signs	No	No	SEUG Data	Complete
HOVE	Soils	Yes	No		Incomplete
HOVE	Topography	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Trails	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	R:\GIS\	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	R:\GIS\	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	R:\GIS\	Complete
HOVE	Utilities	No	Yes	R:\GIS\	Complete
HOVE	Utilities	No	Yes	R:\GIS\	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	No	SEUG Data	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	Yes	SEUG Data	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
HOVE	Utilities	No	No	G:/GIS/Data/Parks/	Complete
HOVE	Vegetation, general	No	No	G:/GIS/Data/Parks/	Complete
HOVE	Vegetation, mapped and classified	No	No	G:/GIS/Data/Parks/	Work in progress
HOVE	Vertebrates, general	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Vertebrates, TES	No	Yes		Incomplete
HOVE	Water bodies	Yes	No	G:/GIS/Data/Parks/	Work in progress
HOVE	Weather data	Yes	No	G:/GIS/Data/Parks/	Complete
HOVE	Wilderness	No	Yes		Incomplete
NABR	Archaeology	No	No	SEUG Data	Complete
NABR	Archaeology	No	No	SEUG Data	Complete
NABR	Archaeology	No	No	SEUG Data	Complete
NABR	Archaeology	No	No	SEUG Data	Complete
NABR	Boundaries	No	No	SEUG Data	Complete
NABR	Boundaries	No	No	G:/GIS/Data/Parks/	Complete
NABR	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Buildings	No	Yes	G:/GIS/Data/Parks/	Work in progress
NABR	Campsites	Yes	No	G:/GIS/Data/	Complete
NABR	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	DEM	No	No	G:/GIS/Data/Parks/	Complete
NABR	DOQQ	Yes	No	F:/	Complete
NABR	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	DRG	Yes	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
NABR	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Fences	No	Yes		Incomplete
NABR	Fire	No	Yes		Incomplete
NABR	Geology	No	No	G:/GIS/Data/Parks/	Complete
NABR	Geology	No	No	G:/GIS/Data/Parks/	Complete
NABR	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Hydro	Yes	No	G:/GIS/Data/Parks/	Work in progress
NABR	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Work in progress
NABR	Hydro, seeps-springs-tinajas etc	No	Yes		Incomplete
NABR	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Misc	No	No	G:/GIS/Data/Parks/	Complete
NABR	Monitoring, air quality	No	Yes		Incomplete
NABR	Monitoring, climate/weather	No	Yes		Incomplete
NABR	Monitoring, other	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Monitoring, other	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Monitoring, vegetation	No	No	G:/GIS/Data/Parks/	Complete
NABR	Monitoring, vertebrates	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Monitoring, water quality	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Ownership	No	Yes		Not applicable
NABR	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Plants, exotic/invasive	No	Yes	SEUG Data	Complete
NABR	Plants, exotic/invasive	No	Yes	SEUG Data	Complete
NABR	Plants, exotic/invasive	No	Yes	SEUG Data	Complete
NABR	Plants, TES	No	Yes		Incomplete
NABR	Pullouts	No	Yes		Incomplete
NABR	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Topography	No	Yes	F:/	Complete
NABR	Topography	No	Yes	SEUG Data	Complete
NABR	Trails	Yes	No	G:/GIS/Data/Parks/	Complete
NABR	Utilities	No	Yes	SEUG Data	Complete
NABR	Utilities	No	No	G:/GIS/Data/Parks/	Complete
NABR	Utilities	No	Yes	SEUG Data	Complete
NABR	Utilities	No	Yes	SEUG Data	Complete
NABR	Utilities	No	Yes	SEUG Data	Complete
NABR	Utilities	No	Yes	SEUG Data	Complete
NABR	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
NABR	Vegetation, general	Yes	No	F:/	Complete
NABR	Vegetation, general	Yes	No	SEUG Data	Complete
NABR	Vegetation, mapped and classified	No	Yes	G:/GIS/Data/Parks/	Work in progress
NABR	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
NABR	Vertebrates, TES	No	Yes		
NABR	Water bodies	No	Yes	G:/GIS/Data/Parks/	Work in progress

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
NABR	Weather data	No	No	G:/GIS/Data/Parks/	Incomplete
NABR	Weather data	No	No	G:/GIS/Data/Parks/	Complete
NABR	Wilderness	No	Yes		Incomplete
NCPN	Boundaries	Yes	No	SEUG Data	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data\	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data\	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data\	Complete
NCPN	Boundaries	No	No	SEUG Data	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data\	Complete
NCPN	Boundaries	No	No	R:\GIS\	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data	Complete
NCPN	Boundaries	Yes	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	Boundaries	No	No	SEUG Data	Complete
NCPN	Boundaries	No	No	SEUG Data	Complete
NCPN	Boundaries	No	No	SEUG Data	Complete
NCPN	Boundaries	No	No	C:\workspace\gis_data\	Complete
NCPN	Boundaries	No	No	SEUG Data	Complete
NCPN	Boundaries	No	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	DLG	No	No	SEUG Data	Complete
NCPN	DRG	No	No	C:\workspace\gis_data\	Complete
NCPN	DRG	No	No	SEUG Data	Complete
NCPN	DRG	No	No	C:\workspace\gis_data\	Complete
NCPN	Hydro	Yes	No	C:\workspace\gis_data\	Complete
NCPN	Hydro	Yes	No	SEUG Data	Complete
NCPN	Hydro	Yes	No	SEUG Data	Complete
NCPN	Hydro	Yes	No	C:\workspace\gis_data\	Complete
NCPN	Monitoring, air quality	No	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	Monitoring, air quality	No	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	Monitoring, air quality	No	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	Monitoring, air quality	No	No	G:/GIS/Data/Regional/NCP_Network/	Complete
NCPN	Monitoring, water quality	Yes	No	C:\workspace\gis_data\	Complete
NCPN	Monitoring, water quantity	Yes	No	C:\workspace\gis_data\	Work in progress
NCPN	Ownership	No	No	G:\dale\	Complete
NCPN	Ownership	No	No	SEUG Data	Complete
NCPN	Ownership	No	No	SEUG Data	Complete
NCPN	Ownership	No	No	G:\dale\	Complete
NCPN	Ownership	No	No	SEUG Data	Complete
NCPN	Ownership	No	No	SEUG Data	Complete
NCPN	Ownership	No	Yes	SEUG Data	Complete
NCPN	Ownership	No	Yes	SEUG Data	Complete
NCPN	Ownership	No	No	G:\dale\	Complete
NCPN	PLSS	No	No	SEUG Data	Complete
NCPN	Roads	No	No	SEUG Data	Complete
NCPN	Roads	Yes	No	SEUG Data	Complete
NCPN	Vegetation, general	No	No	G:/GIS/Data/Regional/Colo_plat	Complete
NCPN	Vertebrates, general	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, general	No	Yes	SEUG Data	Unknown

[illegible]

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	Vertebrates, TES	No	Yes	SEUG Data	Unknown
NCPN	wilderness	No	Yes	SEUG Data	Complete
NCPN	wilderness	No	Yes	SEUG Data	Complete
Other	Boundaries	No	No	c:\workspace\gis_data\I&M_data\	Complete
PISP	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
PISP	Buildings	No	No	G:/GIS/Data/Parks/	Complete
PISP	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
PISP	DEM	No	No	G:/GIS/Data/Parks/	Complete
PISP	DOQQ	No	Yes		
PISP	DOQQ	Yes	No	G:/GIS/Data/Parks/	Complete
PISP	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
PISP	DRG	No	No	C:\workspace\gis_data\	Complete
PISP	Fences	No	Yes		
PISP	Fire	No	Yes		
PISP	Geology	Yes	No	G:/GIS/Data/	Complete
PISP	Hydro	No	No		Work in progress
PISP	Hydro	No	No	http://www.nps.gov/gis	Complete
PISP	Hydro	Yes	No	G:/GIS/Data/Parks/	Complete
PISP	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Work in progress
PISP	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
PISP	Hydro, seeps-springs-tinajas etc	No	Yes		
PISP	Misc	No	No	G:/GIS/Data/Parks/	Complete
PISP	Monitoring, air quality	Yes	No		
PISP	Monitoring, sound	No	Yes		
PISP	Monitoring, water quality	No	Yes	C:\workspace\gis_data\	Complete
PISP	Parking lots	No	No	G:/GIS/Data/Parks/	Complete
PISP	Plants, exotic/invasive	No	Yes		
PISP	Plants, TES	No	Yes		
PISP	Pullouts	No	Yes		Not applicable
PISP	Roads	No	Yes	C:\workspace\gis_data\	Complete
PISP	Roads	No	Yes	G:/GIS/Data/Parks/	Complete
PISP	Soils	Yes	No		
PISP	Topography	No	Yes		
PISP	Trails	No	Yes		
PISP	Utilities	No	Yes		
PISP	Vegetation, general	Yes	No		
PISP	Vegetation, mapped and classified	No	No	G:/GIS/Data/Parks/	Not collected
PISP	Vertebrates, general	Yes	No	G:/GIS/Data/Parks/	Complete
PISP	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
PISP	Vertebrates, TES	No	Yes		
PISP	Water bodies	No	No	G:/GIS/Data/Parks/	Work in progress
PISP	Weather data	Yes	No		
PISP	Weather data	No	No	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
PISP	Wilderness	No	Yes		Not applicable
SCPN	Boundaries	No	No	c:\workspace\gis_data\I&M_data\	Complete
SEUG	Boundaries	No	No	SEUG Data	Complete
SEUG	Boundaries	No	No	R:\GIS\	Complete
SEUG	Boundaries	Yes	No	SEUG Data	Complete
SEUG	Buildings	No	No	SEUG Data	Complete
SEUG	DEM	No	No	SEUG Data	Complete
SEUG	DEM	No	No	SEUG Data	Complete
SEUG	DEM	No	No	SEUG Data	Complete
SEUG	DEM	No	Yes	SEUG Data	Complete
SEUG	DEM	No	No	SEUG Data	Complete
SEUG	DEM	Yes	No	SEUG Data	Complete
SEUG	DLG	No	No	SEUG Data	Complete
SEUG	DOQQ	No	No	SEUG Data	Complete
SEUG	DRG	No	No	R:\GIS\	Complete
SEUG	DRG	No	No	R:\GIS\	Complete
SEUG	DRG	No	No	SEUG Data	Complete
SEUG	DRG	No	No	R:\GIS\	Complete
SEUG	DRG	No	No	SEUG Data	Complete
SEUG	Hydro	No	Yes	SEUG Data	Complete
SEUG	Hydro	No	Yes	R:\GIS\	Complete
SEUG	Hydro	No	No	SEUG Data	Complete
SEUG	Hydro	No	No	SEUG Data	Complete
SEUG	Hydro	No	Yes	SEUG Data	Complete
SEUG	Hydro	Yes	No	R:\GIS\	Complete
SEUG	Mines	No	No	SEUG Data	Complete
SEUG	Misc	No	Yes	SEUG Data	Complete
SEUG	Monitoring, vertebrates	No	No	SEUG Data	Complete
SEUG	Monitoring, vertebrates	No	No	SEUG Data	Complete
SEUG	Ownership	No	Yes	R:\GIS\	Complete
SEUG	Ownership	No	No	G:\dale\	Complete
SEUG	Ownership	No	No	G:\dale\	Complete
SEUG	Plants, exotic/invasive	No	Yes	SEUG Data	Complete
SEUG	Plants, TES	No	Yes	G:/GIS/Workspace/	Work in progress
SEUG	Roads	No	No	SEUG Data	Complete
SEUG	Roads	No	No	SEUG Data	Complete
SEUG	Roads	No	No	SEUG Data	Complete
SEUG	Roads	No	No	R:\GIS\	Complete
SEUG	Soils	Yes	No	SEUG Data	Complete
SEUG	Topography	No	Yes	SEUG Data	Complete
SEUG	Topography	No	Yes	SEUG Data	Complete
SEUG	Topography	No	Yes	SEUG Data	Complete
SEUG	Topography	No	Yes	SEUG Data	Complete
SEUG	Topography	No	Yes	SEUG Data	Complete
SEUG	Utilities	No	No	SEUG Data	Complete
SEUG	Utilities	No	No	SEUG Data	Complete
SEUG	Utilities	No	No	SEUG Data	Complete
SEUG	Vertebrates, general	No	Yes	SEUG Data	Work in progress
SEUG	Vertebrates, general	No	Yes	SEUG Data	Work in progress
SEUG	Vertebrates, general	No	Yes	SEUG Data	Complete
SEUG	Vertebrates, general	No	No	SEUG Data	Work in progress

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
SEUG	Vertebrates, general	No	Yes	SEUG Data	Work in progress
SEUG	Vertebrates, general	No	No	SEUG Data	Work in progress
SEUG	Vertebrates, TES	No	Yes	SEUG Data	Work in progress
SEUG	Vertebrates, TES	No	Yes	SEUG Data	Work in progress
SEUG	Vertebrates, TES	No	Yes	SEUG Data	Work in progress
SEUG	wilderness	No	Yes	SEUG Data	Complete
TICA	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
TICA	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	DEM	Yes	No	G:/GIS/Data/Parks/	Complete
TICA	DOQQ	No	No	G:/GIS/Data/Parks/	Complete
TICA	DOQQs Color	No	Yes		Not collected
TICA	DRG	Yes	No	G:/GIS/Data/Parks/	Complete
TICA	Fences	No	Yes		
TICA	Fire	No	Yes		
TICA	Geology	No	No	G:/GIS/Data/Parks/	Complete
TICA	Geology	Yes	No	G:/GIS/Data/	Complete
TICA	Geology	No	No	G:/GIS/Data/Parks/	Complete
TICA	Hydro	No	No	G:/GIS/Data/Parks/	Incomplete
TICA	Hydro	No	No	http://www.nps.gov/gis	Complete
TICA	Hydro	No	No	C:\workspace\gis_data\	Complete
TICA	Hydro	Yes	No	G:/GIS/Data/Parks/	Complete
TICA	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	Hydro, seeps-springs-tinajas etc	No	Yes		
TICA	Hydro, seeps-springs-tinajas etc	No	Yes	C:\workspace\gis_data\	Complete
TICA	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Incomplete
TICA	Misc	No	No	C:\workspace\gis_data\	Complete
TICA	Misc	No	No	G:/GIS/Data/Parks/	Complete
TICA	Monitoring, air quality	Yes	No		
TICA	Monitoring, other	No	No	G:/GIS/Data/Parks/	Complete
TICA	Monitoring, sound	No	Yes		
TICA	Monitoring, water quality	No	Yes	C:\workspace\gis_data\	Complete
TICA	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	Plants, exotic/invasive	No	Yes	http://www.nps.gov/tica/RMweb/	Complete
TICA	Plants, general	No	No	G:/GIS/Data/Parks/	Complete
TICA	Plants, TES	No	Yes		
TICA	Pullouts	No	Yes		Not applicable
TICA	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
TICA	Roads	No	No	G:/GIS/Data/Parks/	Complete
TICA	Soils	Yes	No		
TICA	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	Trails	No	No	G:/GIS/Data/Parks/	Complete
TICA	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	Utilities	No	No	G:/GIS/Data/Parks/	Complete
TICA	Vegetation, general	Yes	No	http://www.nps.gov/tica/RMweb/	
TICA	Vegetation, mapped and classified	No	No	G:/GIS/Data/Parks/	Not collected

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
TICA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
TICA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
TICA	Vertebrates, general	No	No	G:/GIS/Data/Parks/	Complete
TICA	Vertebrates, TES	No	Yes		
TICA	Water bodies	No	No	G:/GIS/Data/Parks/	Incomplete
TICA	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
TICA	Weather data	Yes	No	G:/GIS/Data/Parks/	Work in progress
TICA	Wilderness	No	Yes		Not applicable
US	Boundaries	No	No	SEUG Data	Complete
US	Boundaries	No	No	SEUG Data	Complete
US	Boundaries	No	No	SEUG Data	Complete
US	Boundaries	No	No	SEUG Data	Complete
US	Boundaries	No	No	SEUG Data	Complete
US	Boundaries	No	No	R:\GIS\	Complete
US	Boundaries	No	No	C:\WORKSPACE\GIS_DATA\US\BOU	Complete
US	Boundaries	No	No	NDARIES\NAD27	Complete
US	DRG	No	No	C:\workspace\gis_data\	Complete
US	DRG	No	No	SEUG Data	Complete
US	DRG	No	No	C:\workspace\gis_data\	Complete
US	DRG	No	No	C:\workspace\gis_data\	Complete
US	Hydro	No	No	SEUG Data	Complete
US	Hydro	No	No	SEUG Data	Complete
US	Roads	No	No	SEUG Data	Complete
UT	Boundaries	No	No	C:\workspace\gis_data\	Complete
UT	Boundaries	No	No	C:\workspace\gis_data\	Complete
UT	Boundaries	No	No	C:\workspace\gis_data\	Complete
UT	GAP data	No	No	SEUG Data	Complete
UT	Geology	No	No	G:/GIS/Data/	Complete
UT	Hydro	No	No	C:\workspace\gis_data\	Complete
UT	Hydro	No	Yes	C:\workspace\gis_data\	Complete
UT	Ownership	No	Yes	C:\workspace\gis_data\	Complete
UT	Plants, TES	No	No	C:\workspace\gis_data\	Complete
UT	PLSS	No	No	C:\workspace\gis_data\	Complete
UT	Roads	No	No	SEUG Data	Complete
UT	Roads	No	No	SEUG Data	Complete
UT	Soils	Yes	No	SEUG Data	Complete
UT	Vegetation, general	Yes	No	SEUG Data	Complete
UT	Vertebrates, general	No	Yes	C:\workspace\gis_data\	Complete
UT	Vertebrates, TES	No	Yes	C:\workspace\gis_data\	Complete
UT	Vertebrates, TES	No	No	C:\workspace\gis_data\	Complete
WY	Boundaries	No	No	C:\workspace\gis_data\	Complete
WY	Ownership	No	Yes	C:\workspace\gis_data\	Complete
ZION	Boundaries	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Boundaries	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Boundaries	No	Yes	C:\workspace\gis_data\parks/	Complete
ZION	Buildings	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Buildings	No	No	G:/GIS/Data/Parks/	Complete
ZION	Buildings	No	No	G:/GIS/Data/Parks/	Complete
ZION	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Campsites	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Campsites	No	No	G:/GIS/Data/Parks/	Complete
ZION	Campsites	No	No	G:/GIS/Data/Parks/	Complete
ZION	DEM	No	No	G:/GIS/Data/Parks/	Complete
ZION	DEM	Yes	No	C:\workspace\gis_data\	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
ZION	DEM	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	DOQQs Color	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	DRG	No	No	C:\workspace\gis_data\	Complete
ZION	DRG	No	No	G:/GIS/Data/Parks/	Complete
ZION	Fences	No	Yes		
ZION	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Fire	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Fire	No	No	G:/GIS/Data/Parks/	Complete
ZION	Geology	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Hydro	No	No	G:/GIS/Data/Parks/	Incomplete
ZION	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro	No	Yes	http://www.nps.gov/gis	Complete
ZION	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro, seeps-springs-tinajas etc	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Incomplete
ZION	Hydro, seeps-springs-tinajas etc	No	No	G:/GIS/Data/Parks/	Complete
ZION	Misc	No	No	http://www.nps.gov/gis	Complete
ZION	Misc	No	No	C:\workspace\gis_data\	Complete
ZION	Misc	No	Yes	http://www.nps.gov/gis	Complete
ZION	Misc	No	No	G:/GIS/Data/Parks/	Complete
ZION	Misc	No	No	http://www.nps.gov/gis	Complete
ZION	Monitoring, air quality	Yes	No		
ZION	Monitoring, sound	No	Yes		
ZION	Monitoring, water quality	Yes	No		
ZION	Parking lots	No	No	G:/GIS/Data/Parks/	Complete
ZION	Parking lots	No	No	G:/GIS/Data/Parks/	Complete
ZION	Parking lots	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Plants, exotic/invasive	No	Yes		
ZION	Plants, TES	No	Yes		
ZION	Pullouts	No	Yes		
ZION	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Roads	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Roads	Yes	No	C:\workspace\gis_data\	Complete
ZION	Roads	Yes	No	http://www.nps.gov/gis	Complete
ZION	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Soils	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Topography	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Trails	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Utilities	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vegetation, general	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Vegetation, general	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Vegetation, mapped and classified	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, general	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete

Spatial Extent	Data Theme	12 Basic Data Set	I&M Essential	Main Location	Status
ZION	Vertebrates, TES	No	No	ZION	Complete
ZION	Vertebrates, TES	No	Yes	http://www.nps.gov/gis	Complete
ZION	Vertebrates, TES	No	No	ZION	Complete
ZION	Vertebrates, TES	No	No	ZION	Complete
ZION	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, TES	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Vertebrates, TES	No	No	ZION	Complete
ZION	Water bodies	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Water bodies	No	No	G:/GIS/Data/Parks/	Incomplete
ZION	Water bodies	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Water bodies	Yes	No	G:/GIS/Data/Parks/	Complete
ZION	Weather data	Yes	No		
ZION	Weather data	No	Yes	G:/GIS/Data/Parks/	Complete
ZION	Wilderness	No	Yes	C:\workspace\gis_data\	Complete

Appendix I. Summary of NCPN Data Resources

3. Status of Data Mining in NCPN Parks

Park	No. of Dataset Catalog Records	No. of NatureBib Records	Most Recent Data Mining Visit	Data Mining Status
Arches NP	50	934	March 2005	Last intensive data mining was in 2002; some data mining completed in 2005; additional work is planned when staff is available in September 2005; need to fill gaps and catalog new data acquired since then; worked with staff to establish a more efficient data flow.
Canyonlands NP	58	1346		
Hovenweep NM	15	268		
Natural Bridges NM	26	360		
Black Canyon of the Gunnison NP	13	345	July 2002	General data mining for gaps in Dataset Catalog performed in 2002. Data mining planned for October 2005.
Curecanti NRA	29	477		
Bryce Canyon NP	33	825	August 2005	Accomplished most updating of NatureBib and Dataset Catalog records. Trained park staff to complete and continue updates of NatureBib records. Awaiting NatureBib record sensitivity review and Dataset Catalog records update from resource manager. Anticipated completion is September 2005.
Capitol Reef NP	40	1221	August 2005	General data mining completed in August 2005; awaiting NatureBib record sensitivity review and Dataset Catalog records update from resource manager. Anticipated completion is September 2005. A large number of rare plant survey report citations added to NatureBib.
Colorado NM	14	511	July 2005	L. Claussen at COLM handles NatureBib entry. Awaiting NatureBib record sensitivity review from resource management staff. Dataset Catalog review and updates in progress.

Park	No. of Dataset Catalog Records	No. of NatureBib Records	Most Recent Data Mining Visit	Data Mining Status
Dinosaur NM	47	1350	March 2005	Working with DINO staff and Western Archeological Conservation Center (WACC) to plan efficient completion of data mining and coordination of cataloging activities. Dataset Catalog records reviewed with resource manager; most natural resource data currently being cataloged at WACC; NatureBib records update completed; documented data sources and data mining history in preparation for additional work; most document locations in NatureBib need updating.
Fossil Butte NM	16	234	June 2005	Awaiting NatureBib records sensitivity check from resource manager. Dataset Catalog update near completion. Anticipated completion is September 2005. Bibliographic data well organized at park using ProCite.
Golden Spike NHS	5	111	August 2002	Very little natural resource data on site.
Timpanogos Cave NM	11	321	June 2005	NatureBib sensitivity check completed. Dataset Catalog records update near completion. Anticipated completion is September 2005. Bibliographic data well organized at park.
Cedar Breaks NM	9	228	June 2004	Up-to-date. Dataset Catalog records posted online; NatureBib records sensitivity checked and submitted for public access.
Pipe Spring NM	9	118		
Zion NP	48	898		

Appendix J. Status of the 12 Basic Data Sets, Northern Colorado Plateau Network.

Dataset	ARCH	BLCA	BRCA	CANY
Natural resource bibliography	In progress. 936 records as of 10/2005	In progress. 346 records as of 10/2005	In progress. 823 records as of 10/2005	In progress. 1348 records as of 10/2005
Base cartographic data (assistance through IMR GIS) <i>Data resides with the NCPN GIS shop.</i>	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as 1:40,000 color DOQQs.
Geology map (assistance through GRI) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site</i> http://www/ftw.nrcs.usda.gov/ssur_data.html	Completed digital coverage of park.	Completed digital coverage of park.	Completed digital coverage of park.	Completed digital coverage of park.
Soils (assistance from USDA-NRCS) from soils workshop (Pete Biggam) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site</i> http://www/ftw.nrcs.usda.gov/ssur_data.html	Complete SSURGO2 database complete, part of Grand Co., central part certified survey. Park is to be mapped at park level with a combination of new mapping and adjustment of existing linework, in FY05+.	In Progress, no park specific products. NRCS tentatively planned for FY06. Park coverage is part of the Ridgeway area survey (not yet started) & the Paonia Area SSURGO certified survey (Delta, Gunnison, Montrose, Ouray counties). Work needs to be completed to merge coverages/databases (or start/complete new mapping effort for park area).	Older attribute SSURGO database complete & certified. Park is part of Panguitch area survey.	Complete SSURGO coverage of park via 3 county soil surveys at different times and scales. Grand and San Juan surveys were SSURGO certified as Canyonlands Soil Survey in 2004; Henry Mnts survey previously certified completes coverage of park. Park is to be mapped at park level with a combination of new mapping and adjustment of existing linework, in FY05+.

Dataset	ARCH	BLCA	BRCA	CANY
Weather data	NWS COOP daily weather data available, 6/1/1980 - present. Data assembled and posted on NCPN website.	NWS COOP daily weather data available, 10/9/03 - present; RAWS station, 6/1997 - present, south rim of park; CRN climate station (1 mi from park entrance station) , 7/2004 - present. Data assembled and posted on NCPN website.	NWS COOP daily readings, 6/1/1959 - present, 2 RAWS stations in park, one near headquarters (est. 1/2003), one at south end (est. 6/1990); SNOTEL climate station at Agua Canyon, 1994 - present; Snow Course site, 1935 - present. Data assembled and posted on NCPN website.	Two NWS COOP station daily readings, 1965 - present; Two clim-met stations. Data assembled and posted on NCPN website.
Air quality (assistance through ARD)	"Class I" area. Historic air-quality monitoring data are available for Arches, but air quality is not currently monitored in the Park.	Class I" area. Limited air quality monitoring: Visibility monitoring was conducted from 1985 until 1993; passive ozone monitoring during the summer since 1994.	"Class I" area. Visibility monitored photographically since 1984 and by visual range estimates from 1978 until 1991. Fine and coarse airborne particles monitored since 1988; passive ozone during summer since 1995. SO2 monitored from 1988 until 1992. Since 1985, wet deposition monitored in association with the NADP/NTN program.	"Class I" area. Visibility monitored since 1978; fine and coarse airborne particles since 1988, and light extinction since 1987. Ozone at ISKY since 1992. Sulfur dioxide (SO2) at ISKY from 1988 until 1995.
Location of air quality monitoring stations	Air Quality station within park.	Air Quality station within park.	Air Quality station within park.	Air Quality station within park in ISKY district.
Water body locations and classification	1:100k & 1:24k data available; 1:24K data attributed with stream classification. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data attributed with stream classification. In process of attaining NHD 1:24k geodatabases for park.
Water quality data	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.

Dataset	ARCH	BLCA	BRCA	CANY
Vegetation map	Aerial photography and orthophotos 1:12K acquired in 2002 for new veg mapping project. Field work and plant association classification completed in 2003. Photo interpretation work will be completed in 2005, followed by accuracy assessment in 2006. Final vegetation map & report are forthcoming in 2007.	BLCA staff initiated vegetation mapping in 2001. This effort was merged with the NCPN network-wide vegetation mapping effort in 2002. New 1:12K aerial photography and orthophotos were acquired in 2002. Field data collection was conducted during 2001-2003. Photo interpretation and AA completed for BLCA in 2004. Photo interpretation and AA for CURE will be completed in 2005. Final vegetation map and report to be completed by 2006.	Aerial photograph and digital orthophotos 1:12K acquired in 2002. Field plot data collection, classification and photo interpretation conducted in 2005. Accuracy assessment is scheduled for 2006. Final vegetation map and products are scheduled for early 2007.	Aerial photography and orthophotos 1:12K acquired in 2002 for new veg mapping project. Field work was conducted during the 2003-2004 field seasons. Plant association classification work scheduled for fall 2004. Photo interpretation will be conducted in 2005 and AA scheduled for 2006. Final map and report products will be completed in 2007 or 2008.
Documented species list of vertebrates and vascular plants	Certified species lists for amphibians and reptiles. All remaining vertebrate and vascular plant certified lists projected to be completed by December 2005.	Certified species lists for amphibians and reptiles. Certified species list for birds, imminent. All remaining vertebrate and vascular plant certified lists projected to be completed by end of FY05.	Certified species lists for amphibians, reptiles, mammals, and fish. Vascular plants will be certified in November, 2005; bird list will be certified in the first quarter of calendar 2006.	Certified species lists for amphibians and reptiles. All remaining vertebrate and vascular plant certified lists projected to be completed by end of calendar year 2005.
Species distribution and status of vertebrates and vascular plants	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Fish inventory in progress. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete small mammals and birds and vascular plants; data being incorporated into NPSpecies for certification. Herp and fish inventories in progress. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals and vascular plants; data being incorporated into NPSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for most small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Fish inventory in progress. Bat inventory complete (conducted by the USGS). Some additional targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.

Appendix J.

Dataset	CARE	CEBR	COLM	CURE
Natural resource bibliography	In progress. 1223 records as of 10/2005	In progress. 229 records as of 10/2005	In progress. 512 records as of 10/2005	In progress. 478 records as of 10/2005
Base cartographic data (assistance through IMR GIS) <i>Data resides with the NCPN GIS shop.</i>	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color DOQQs.
Geology map (assistance through GRI) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site http://www/ftw.nrcs.usda.gov/ssur_data.html</i>	Completed digital coverage of park. Awaiting cross sections and metadata.	Completed digital coverage of park.	Completed digital coverage of park.	Completed digital coverage of park (with BLCA coverage).
Soils (assistance from USDA-NRCS) from soils workshop (Pete Biggam) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site http://www/ftw.nrcs.usda.gov/ssur_data.html</i>	In progress; un-certified SSURGO park soils database and linework.	Inactive - Non Project, USFS	NRCS mapping in progress with Mesa County. Park currently has a soils coverage.	In Progress, no park specific products. NRCS tentatively planned for FY06. Park coverage is part of the Ridgeway area survey (not yet started) & the Paonia Area SSURGO certified survey (Delta, Gunnison, Montrose, Ouray counties). Work needs to be completed to merge coverages/ databases (or start/complete new mapping effort for park area).

Dataset	CARE	CEBR	COLM	CURE
Weather data	NWS COOP daily readings since 1967; SNOwNET climate station, 12/1997 - present. Data assembled and posted on NCPN website.	NWS COOP daily readings in park from 1948-1970; station one mile south of monument active since 1964. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1948. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1967. Data assembled and posted on NCPN website.
Air quality (assistance through ARD)	"Class I" area. Visibility monitored from 1978 to 1987. Passive ozone monitoring during summer since 1995, fine and coarse airborne particles since March 2000	Minimal data. St. Clair and Smith (1994) established a biomonitoring program at the Monument to document long-term changes in air-quality conditions reflected by sensitive lichen taxa.	Visibility data from 1981 until 1991, ozone and SO2 from 1984 until 1992; biomonitoring plots were established to evaluate effects of ozone and SO2 on sensitive lichen taxa and pinyon pine.	No data available.
Location of air quality monitoring stations	Air Quality station within park.	No air quality monitoring stations within park.	Air Quality station within park.	No air quality monitoring stations within park.
Water body locations and classification	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.
Water quality data	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.

Dataset	CARE	CEBR	COLM	CURE
Vegetation map	CARE staff initiated vegetation mapping in the mid 1990s. This effort was merged with the NCPN network-wide vegetation mapping effort in 2001. Aerial photography and orthophotos 1:12K was aquired in 2002. New plot data collection and classification was conducted in 2003 and 2004. Photo interpretation completed in spring of 2005. AA work completed in the 2005 field season . Final map and report products will be available by early 2006.	Aerial photograph and digital orthophotos acquired in 2002. Field plot data collection and photo interpretation will be conducted in 2006. Accuracy assessment scheduled for 2007. Final vegetation map and products are scheduled for early 2008.	Aerial photograph and digital orthophotos acquired in 2002. Field plot data collection and photo interpretation was completed during the 2003 field season. Accuracy assessment was completed in 2004. Final vegetation map and products are scheduled for late 2005.	BLCA staff initiated vegetation mapping in 2001. This effort was merged with the NCPN network-wide vegetation mapping effort in 2002. New 1:12K aerial photography and orthophotos were aquired in 2002. Field data collection was conducted during 2001-2003. Photo interpretation and AA completed for BLCA in 2004. Photo interpretation and AA for CURE will be completed in 2005. Final vegetation map and report to be completed by 2006.
Documented species list of vertebrates and vascular plants	Certified species lists for amphibians, reptiles, mammals, and fish. Vascular plant list will be certified in November, 2005; bird list will be certified in the first quarter of calendar year 2006.	Certified species lists for amphibians, reptiles, and mammals. Vascular plant and bird lists will be certified by the end of calendar year 2005.	Certified species lists for amphibians, reptiles, and mammals. All remaining vertebrate and vascular plant certified lists projected to be completed by end of FY05.	Certified species lists for amphibians, reptiles, fish, birds, and mammals, and vascular plants to be complete by the end of FY05.
Species distribution and status of vertebrates and vascular plants	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Fish inventory in progress. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals and birds; data being incorporated into NPSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps and small mammals; data being incorporated into NPSpecies for certification. Bird inventory in its final stages. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Fish inventory on-going. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.

Appendix J.

Dataset	DINO	FOBU	GOSP	HOVE
Natural resource bibliography	In progress. 1351 records as of 10/2005	In progress. 235 records as of 10/2005	In progress. 112 records as of 10/2005	In progress. 270 records as of 10/2005
Base cartographic data (assistance through IMR GIS) <i>Data resides with the NCPN GIS shop.</i>	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage. Color DOQQs will be created from the 1:12k flights of June 2004 (part of vegetation mapping project).	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete black & white DOQQ coverage as well as both 10 & 30 meter DEMs. Need Rozel quad for complete DRG coverage, and need color DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage. Need color DOQQs.
Geology map (assistance through GRI) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site</i> http://www/ftw.nrcs.usda.gov/ssur_data.html	Completed digital coverage of park.	Preliminary work done. Currently mapping several quads of the park (FY02). Updated version FY04 (?).	In Progress - have data for 4 of 5 quads, GRI to review and complete metadata.	Completed digital coverage of park.
Soils (assistance from USDA-NRCS) from soils workshop (Pete Biggam) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site</i> http://www/ftw.nrcs.usda.gov/ssur_data.html	SSURGO2 database complete & certified, Dinosaur NM Park survey (not part of county or other survey area).	Inactive - Non Project, BLM. Park soils coverage would span 2 counties (Sublette & Lincoln).	SSURGO2 database complete & certified, part of Box Elder county, eastern survey.	SSURGO, Need to determine other SSA's

Dataset	DINO	FOBU	GOSP	HOVE
Weather data	Two NWS COOP stations active, one in Quarry (est. 1958, moved 2002 - present), one at Headquarters (est. 1965). Fire-weather being collected from Quarry site 1965-2002. RAWs station at Success Burn/Yampa Bench, 1998 - present. CRN station established, 9/2004. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1990. Data assembled and posted on NCPN website.	NWS COOP station located 25 mi. east of site; data since 1871. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1957. Data assembled and posted on NCPN website.
Air quality (assistance through ARD)	Historic data available; none current. Visibility from 1979 until 1981 and again from 1985 until 1991. Fine and coarse airborne particulates monitored 1982 until 1985. Program recently established to document long-term changes reflected by sensitive lichen taxa.	No data available.	No data available.	No data available.
Location of air quality monitoring stations	Air Quality station within park.	No air quality monitoring stations within park.	No air quality monitoring stations within park.	No air quality monitoring stations within park.
Water body locations and classification	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k data available; annotated & stream classification of 1:100K maps planned for completion by network in 2005. In process of attaining NHD 1:100k geodatabases for park (1:24k not digital).	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.
Water quality data	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.

Dataset	DINO	FOBU	GOSP	HOVE
Vegetation map	Aerial photography and digital orthophotos acquired in 2001 and 2002. Plot field work for classification completed during 2002 and 2003 field seasons. Classification and photo interpretation will be completed by early 2005. Accuracy assessment work completed in 2005. Final vegetation map and report products will be available by 2006.	Aerial photography at 1:12K was acquired during 2004. Field plot data collection and photo interpretation work is scheduled for 2005. Accuracy assessment will be conducted in 2006. Final map and report products will be available by 2007.	Vegetation mapping project scoping will be conducted in 2005; plot data anticipated to be collected in 2006; Final map and products expected in 2007.	Existing photography was used to initiate vegetation mapping in 2004 when field plot data collection, classification and photo interpretation work were completed. Final map and report products will be forthcoming in 2005.
Documented species list of vertebrates and vascular plants	Certified species lists vertebrates to be complete by the end of FY05. Vascular plants scheduled for certification by March, 2006.	Certified species lists for vertebrates and vascular plants scheduled for completion by the end of FY05.	Certified lists scheduled for completion for all vertebrates by the end of FY05. Vascular plants due for completion in March, 2006.	Certified species lists for amphibians, reptiles, and mammals complete in FY05. Certification of bird and vascular plant lists scheduled for December, 2005.
Species distribution and status of vertebrates and vascular plants	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSSpecies for certification. Fish inventory in progress. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals and birds; data being incorporated into NPSSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals and birds; data being incorporated into NPSSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted in Utah by George Oliver, UDNWR.

Appendix J.

Dataset	NABR	PISP	TICA	ZION
Natural resource bibliography	In progress. 362 records as of 10/2005	In progress. 119 records as of 10/2005	In progress. 322 records as of 10/2005	In progress. 899 records as of 10/2005
Base cartographic data (assistance through IMR GIS) <i>Data resides with the NCPN GIS shop.</i>	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage, as well as color 1:40,000 DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage. Need color DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white DOQQ coverage. Need color DOQQs.	Have basic Hydrology, Transportation, Ownership, Park Boundary, and contour layers. Also have complete coverage for DRGs and 10 & 30 meter DEMs. Complete black & white and color DOQQ coverage.
Geology map (assistance through GRI) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site http://www/ftw.nrcs.usda.gov/ssur_data.html</i>	Completed digital coverage of park.	Completed digital coverage of park.	Completed digital coverage of park.	Completed digital coverage of park.
Soils (assistance from USDA-NRCS) from soils workshop (Pete Biggam) <i>Data resides with the NCPN GIS shop & can be found on the NRCS ftp site http://www/ftw.nrcs.usda.gov/ssur_data.html</i>	SSURGO2 database complete, included in San Juan County central part certified survey. Park is to be mapped at park level with a combination of new mapping and adjustment of existing linework, in FY05+.	SSUGO2 database complete, part of Mohave County Area northeastern part and Coconino county surveys.	Inactive - Non Project, USFS	Older attribute SSURGO database complete & certified. Part of Washington county survey.

Dataset	NABR	PISP	TICA	ZION
Weather data	NWS COOP daily readings since 1965. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1963. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1948. SNOWNET climate station, 12/1997 - present. Data assembled and posted on NCPN website.	NWS COOP daily readings since 1948; RAWs station at Lava Point, 1995 - present; RAWs station near Headquarters, 2002 - present. SNOWNET climate station, 11/1997 - present. Data assembled and posted on NCPN website.
Air quality (assistance through ARD)	Minimal air quality data available.	No data available.	Air quality station established for the U.S. Forest Service in the monument from 1995-2001, currently trying to locate data.	"Class I" area. Visibility monitored from 1985 until 1991, concentrations of fine and coarse airborne particles monitored since March 2000, passive ozone monitoring conducted during summer since 1995. A permanent, continuous ozone monitor is scheduled for installation at Zion during fall 2002.
Location of air quality monitoring stations	No air quality monitoring stations within park.	No air quality monitoring stations within park.	No air quality monitoring stations within park.	Air Quality station within park.
Water body locations and classification	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data to be attributed with stream classification by park and network in 2005. In process of attaining NHD 1:24k geodatabases for park.	1:100k & 1:24k data available; 1:24K data attributed with stream classification. In process of attaining NHD 1:24k geodatabases for park.
Water quality data	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.	Water quality data assembled by USGS; final database and associated tools scheduled for implementation in 2006.

Dataset	NABR	PISP	TICA	ZION
Vegetation map	Aerial photography and orthophotos 1:12K acquired in 2002 for new veg mapping project. Field work was conducted in 2003 and 2004. Photo interpretation and accuracy assessment conducted in 2004. Final vegetation map and products to be completed by 2005.	Vegetation mapping project scoping will be conducted in 2005. Plot data anticipated to be collected in 2006; Final map and products expected in 2007	Vegetation mapping project scoping will be conducted in 2005. Plot data anticipated to be collected in 2006; Final map and products expected in 2007	Final vegetation map and report products completed in 2004.
Documented species list of vertebrates and vascular plants	Certified species lists for amphibians, reptiles, and mammals complete in FY05. Certification of bird and vascular plant lists scheduled for December, 2005.	Certified species lists for amphibians, reptiles, mammals, and vascular plants complete by the end of FY05. Birds scheduled for completion by March, 2006.	Certified species lists for amphibians, reptiles, birds, and mammals complete. Vascular plants scheduled for completion by the end of calendar year 2005.	Certified species lists for amphibians, reptiles, fish, mammals and vascular plants complete by the end of FY05. Certified bird list scheduled for completion by March, 2006.
Species distribution and status of vertebrates and vascular plants	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.	Biological inventories complete for herps, small mammals, birds and vascular plants; data being incorporated into NPSpecies for certification. Fish inventory in progress. Some targeted herp, small mammal and possibly bird inventories to be conducted by George Oliver, UDNWR.

Appendix K. Example of directory structure and documentation for archived data set

Readme.doc

Summary of Archived Data: 2001-2002 Mammalian Inventory

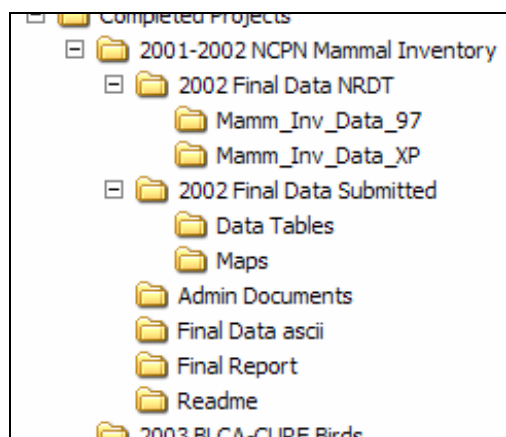
Haymond, S., M. Bogan and E. Valdez. 2003. 2001-2002 mammalian inventory final report for selected Northern Colorado Network parks. U.S. Geological Survey, Arid Lands Field Station, Department of Biology, University of New Mexico, Albuquerque. 147 p. plus maps.

Agreement Numbers: 1443-IA-1341-00-006
1443-IA-1341-01-004
F134102003

Cooperator: USGS, Arid Lands Field Station. Michael Bogan, Principal Investigator
Start Date: 4/01/01
End Date: 1/15/03

NatureBib 548423
Dataset Catalog (NCPN) 443

The purpose of this project was to provide baseline information on the distribution of mammals in 10 network parks, including: BLCA, CURE, CARE, CEBR, PISP, FOBU, GOSP, HOVE, PISP and TICA.



Archive Directory structure as of
September, 2004

Archive Contents:

☐ 2002 Final Data NRDT

This directory contains an MS-Access database developed by NCPN to store final data for the project, which were submitted by the contractor as Excel tables. The database is in I&M Natural Resource Database Template format, i.e., structured by Location, Event, and Observation tables. All tables and fields are documented. Mamm_Inv_Data_97 is the

database in Access 97 format; this database was converted in September, 2004 to Access XP. No associated forms, queries, or reports were created for this database.

☐ 2002 Final Data Submitted

The Data Tables folder in this directory contains the Excel data tables provided to the network as the final contract deliverable. These tables were converted to Microsoft Access format by NCPN. The Maps folder in this directory contains maps as provided by the contractor, in JPG format, in addition to the maps in Word format, which were created by NCPN.

☐ Admin Documents

This folder contains interagency agreements for the project, correspondence, and an electronic copy of the research permit.

☐ Final Data ascii

This folder contains comma-delimited ascii files that correspond to the data tables in the Access database. An additional ascii file contains a list of all tables and fields, field types, and field lengths.

☐ Final Report

This directory contains the final report in Word and pdf format. The Word document, as submitted by the contractor, does not include maps or resumes and therefore does not stand alone as a complete document. The pdf version created by NCPN contains the full text, converted from Word, and also has maps and contractor resumes appended at the end, which corresponds to the format of the final hardcopy report.

Associated Documents

Field forms, copies of field notebooks, research permits, and archival copies of all reports (draft and final) are located in the I&M central files in the data management office in Moab.

Associated GIS Data

All GIS data corresponding to this project are archived on the NCPN server under GIS\Data\Regional\No_Col_Net. FGDC-compliant metadata accompanies the GIS files.

Associated Photographs

Photos associated with this project were scanned and stored as TIFF files in the NCPN\Archive\NCPN Photos subdirectory. Information on each photo has been cataloged in the NCPN photo database. Photos can be retrieved by selecting, in the Project field, all records for the 2001-2002 mammalian inventory.

Specimens

All specimens collected during this project have been deposited at the Museum of Southwest Biology, University of New Mexico, Albuquerque.

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID:** 443**FOR PARK(S):**

Black Canyon of the Gunnison National Park (BLCA)	Capitol Reef National Park (CARE)	Cedar Breaks National Monument (CEBR)
Curecanti National Recreation Area (CURE)	Fossil Butte National Monument (FOBU)	Golden Spike National Historic Site (GOSP)
Hovenweep National Monument (HOVE)	Pipe Spring National Monument (PISP)	Timpanogos Cave National Monument (TICA)

Protection Information**Sensitive?** No**Sens. Type:****Classified:** N/A**Access Restrictions:****CREATE DATE:** 20040929**LAST EDITED:** 20040929**Old Project ID:****Version:****Subject:** Mammalogy

Abstract: Random and targeted searches and trapping methods were used to inventory mammals in 9 NCPN park units: BLCA, CARE, CEBR, CURE, FOBU, GOSP, HOVE, PISP and TICA. Inventory methods included traplines, mistnetting, acoustic surveys, and track and scat surveys. Some mammal groups (e.g., ungulates) were documented opportunistically. Photographs were taken of most, but not all, study locations. Animals that were previously undocumented in a park were kept as vouchers. Trapping and observation locations were recorded using GPS units set to UTM, NAD27. Voucher specimens are housed in the USGS Biological Survey collection at the Museum of Southwestern Biology, University of New Mexico. Person-days, trap-nights, mist net-nights, acoustic hours and survey distance were recorded for each park as appropriate. A total of 14,349 trap-nights, 173 mist net-nights, and 3,302 actual capture events resulted in recording 119 individual species occurrences.

Purpose: The purpose of this project was to provide baseline information on the distribution of mammals in 9 network parks, including: BLCA, CURE, CARE, CEBR, PISP, FOBU, GOSP, HOVE, and TICA.

Keywords:

Animal Studies	exotics/invasive species - animals	mammals
threatened-endangered-sensitive animals	vertebrates	

Related Documents and Data:

doc/dat	BibID	Author(s)	Year	Title
doc.	548423	Haymond, Shauna /Bogan, Michael A. /Valdez, Ernest W.	2003	2001-2002 Mammalian inventory final report for selected Northern Colorado Plateau Network parks
data		Northern Colorado Plateau Network		Digital image database, NCPN

Dataset Dates:**Begin-End:** 20010612 - 20020829**Multiple:****Single:****Metadata:****Status:****Standard:****Priority:****Update Freq:** None Planned**Status:** Inactive**Progress:** Complete**Quality:** VER/VAL Verified and Validated

Quality Report: This is a large, good quality dataset. The principal investigator, Dr. M. Bogan, is considered an authority on mammals in the Northern Colorado Plateau regions and has extensive experience in NCPN parks. Methods followed current standards and are clearly documented in report. Data are in a normalized database structure and underwent quality checks before finalizing.

Coverage: Network-wide

Location: Black Canyon of the Gunnison NP, Capitol Reef NP, Cedar Breaks NM, Curecanti NRA, Fossil Butte NM, Golden Spike NHS, Hovenweep NM, Pipe Spring NM and Timpanogos Cave NM

W. Longitude:	0	East Longitude:	0	UTM Zone:	0
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North Latitude:	0	South Latitude:	0
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Coord. System:	Datum:	Data Type: ANAORG
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Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443**

Table/Layer Name:	Description:
tblDataMgmtLog	Table containing a log of data set manipulations or database object alterations.
tblEventMammal	Table containing sampling date information for Bogan's 2002-2002 NCPN mammal inventory. Child to tblLocationMammal and parent to tblObservationMammal.
tblHabitatData	Table containing habitat data for sampling locations used during Bogan's 2001-2002 NCPN mammal inventory. Can use the field HabLocID to link to tblLocationMammal.
tblLocationMammal	Table containing location data for Bogan's 2001-2002 NCPN mammal inventory. Parent of tblEventMammal.
tblObservationMammal	Table containing observation and specimen data from Bogan's 2001-2002 NCPN mammal inventory. Child to tblEventMammal
tblPhotograph	Table containing some photo information from Bogan's 2001-2002 NCPN mammal inventory. Can use LocID field to link to tblLocationMammal.
tblPhotoLog	Table containing information about general photos taken during Bogan's 2001-2002 NCPN mammal inventory. Not linked to other tables.
tblTraplineInfo	A table derived from the source data. Attempts to provide coordinate data for trapline locations based upon info in source data. Is not a complete listing of all traplines, since couldn't determine all coordinate data for all traplines from source.
tluGeoRefSource	Lookup table containing Geo-Referencing Sources (how coordinate data was derived).
tluLocationError	Lookup table containing ranges of horizontal error for coordinate data.

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443****DATA DICTIONARY****FILENAME: 2001-2002 MammalData.mdb****FILE DESCRIPTION:****TABLE NAME:** tblDataMgmtLog**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing a log of data set manipulations or database object alterations.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 5

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
ActionDate	dbDate	8	The date on which the data set was massaged or manipulated.
ActionMonth	dbText	50	If ActionDate known to month only, use this field and the ActionYear field.
ActionYear	dbText	50	If ActionDate known to year only, use this field.
Action	dbMemo	0	What was done with the data set. How was it altered, massaged, manipulated, etc. Include changes to data and changes to database objects or structures.
Who	dbText	50	The name of the person who performed the action with the data set.

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:****TABLE NAME:** tblEventMammal**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing sampling date information for Bogan's 2002-2002 NCPN mammal inventory. Child to tblLocationMammal and parent to tblObservationMammal.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 4

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
LocationID	dbText	50	Foreign key used to link to tblLocationMammal
EventID	dbText	50	Unique record identifier for this table. Must also be unique for roll-ups of data, so may consist of complicated values.
Date	dbDate	8	The date on which the Location was visited and an Observation made.
Time	dbDate	8	The time of the day when an Observation was made.

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443****FILENAME: 2001-2002 MammalData.mdb****FILE DESCRIPTION:****TABLE NAME:** tblHabitatData**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing habitat data for sampling locations used during Bogan's 2001-2002 NCPN mammal inventory. Can use the field HabLocID to link to tblLocationMammal.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 12

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
HabLocID	dbText	50	Links to same-named field in tblLocationMammals. This field added during conversion from Excel to Access. Used [Location ID] field values, with some modifications to take out weird concatenations in [Location ID].
Location ID	dbText	255	This was the source data field that supposedly had unique location identifiers.
General Habitat Description	dbText	255	General description of the habitat
Physiognomic Class	dbText	255	Choices are: sparse vegetation; non-vascular; nv – woodland; nv – shrubland; nv - dwarf shrubland; nv - herbaceous; nv - sparsely vegetated; herbaceous; dwarf-shrubland; shrubland; woodland; forest
Dominant Species	dbText	255	Enter the name of the species that is dominant within the selected physiognomic class.
Site Hydrology	dbText	255	upland (above and away from floodplains; riparian (along rivers or stream channels); wetland (saturated for extended periods during the growing season); playa lakebed (poorly drained depressions)
Landform	dbText	255	-no description-
Aspect	dbText	255	In degrees
Slope	dbText	255	In degrees
Disturbance	dbText	255	Yes or No
Disturbance Type	dbText	255	-no description-
Habitat Comments	dbText	255	-no description-

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:****TABLE NAME:** tblLocationMammal**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing location data for Bogan's 2001-2002 NCPN mammal inventory. Parent of tblEventMammal.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 29

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
LocationID	dbText	50	Unique identifier for records in this table. Must also be unique for roll-ups of data, so may consist of long and complicated-looking values
MabelID	dbText	50	Foreign key field used by the Colorado Park Networks to link to GIS data. Populated by Network personnel.
Xcoord	dbDouble	8	UTM easting coordinate. Same as [UTM E] where Species

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443**

			UTM's were provided in source data. If they weren't, then it's the same as the [Start UTM E] field.
Ycoord	dbDouble	8	UTM northing coordinate. Same as [UTM N] where Species UTM's were provided in source data. If they weren't, then it's the same as the [Start UTM N] field.
GeoRefSource	dbText	50	Geo-referencing source. The source of the coordinates (ie. how were the coordinates derived). Use tluGeoRefSource lookup table.
LocErr	dbText	50	Location error. An estimate of the horizontal accuracy of the coordinates. Use the tluLocationError lookup table for values.
EPE	dbText	50	EPE of the Xcoord and Ycoord
Park Code	dbText	4	Standard 4-letter Park code
State	dbText	2	Standard 2-letter state abbreviation
County	dbText	25	Name of the county in which the coordinates are located
Location Name	dbText	255	Brief place name or reference name for location (e.g., "Murphy Point" or "Chinle Trailhead")
LocID	dbText	255	A renamed field from the source data that supposedly uniquely identified locations. Well, it didn't. It was called [Location ID] in source data, but that's way too close to the standard [LocationID] field used as the primary key in this table.
HabLocID	dbText	50	Field created to link to tblHabitatData
Location Description	dbText	255	Brief description of location (equivalent to what would appear on a specimen label, e.g., "White Rim Trail near Lathrop Canyon turnout")
Location Directions	dbText	255	How to get to the location.
Trapline Waypoints	dbText	255	Waypoint names assigned by the investigators. "A" suffix should indicate beginning of a trapline, and "B" suffix the endpoint of a trapline.
Radius or Buffer	dbText	255	Indicate radius or buffer of survey point, transect, or area (if applicable) in meters.
UTM Zone	dbText	255	UTM zone in which the coordinates are located.
Start UTM E	dbDouble	8	Trapline start X coordinate. If only start X,Y coordinates provided, it may just indicate a species observation location, or it may indicate just the start point of a trapline. Source data likely is not consistent.
Start UTM N	dbDouble	8	Trapline start Y coordinate. If only start X,Y coordinates provided, it may just indicate a species observation location, or it may indicate just the start point of a trapline. Source data likely is not consistent.
Stop UTM E	dbDouble	8	Trapline stop X coordinate.
Stop UTM N	dbDouble	8	Trapline stop Y coordinate.
EPE1	dbSingle	4	EPE associated with the trapline waypoints UTM's
Species Waypoint	dbText	255	Waypoint name assigned by investigators to mammal observation locations.

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443**

UTM E	dbDouble	8	X coordinate for mammal observation location
UTM N	dbDouble	8	Y coordinate for mammal observation location
EPE2	dbDouble	8	EPE associated with the species waypoint UTM's
GPS Comments	dbText	255	2001 waypoint names
NEWelevation	dbText	50	The elevations were created in workstation ArcInfo using the command LATTICESPOT. A 90 meter DEM was used to derive the elevations (in meters) contained in field/column ELEV_M.
GPS Comments	dbText	255	-no description-

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:**

TABLE NAME: tblObservationMammal

SPATIAL THEME: N/A

DESCRIPTION: Table containing observation and specimen data from Bogan's 2001-2002 NCPN mammal inventory. Child to tblEventMammal

FORMAT: Microsoft Access

NO. OF FIELDS: 25

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
RecordID	dbLong	4	Unique identifier automatically assigned to each record in this table.
EventID	dbText	50	Foreign key used to link to tblEventMammal
SelectionMethod	dbText	255	Method for selecting location (e.g., random, non-random, targeted search, opportunistic observation)
Observer	dbText	255	Person who observed the animal
SamplingMethod	dbText	255	Method used for sampling, detecting, or collecting species data, e.g., vocalization, mist net, pitfall, found dead)
SpeciesCommonName	dbText	255	Common name of the observed animal
SpeciesLatinName	dbText	255	Scientific name of the observed animal
TSN	dbText	255	Called "ITIS code" in source data. Taxonomic Serial Number. Standardized numeric identifier for a species. Every species name (and synonyms) in ITIS (Integrated Taxonomic Information System) is assigned a TSN.
ObservationComments	dbText	255	Comments regarding the animal observation
Sex	dbText	255	Sex of the observed animal
Age	dbText	255	Age of the observed animal. a=adult, j=juvenile, sa=subadult
ReproductiveCondition	dbText	255	Reproductive condition of the observed animal. s=scrotal, l=lactating, p=pregnant, pl=post lactating, ns=nonscrotal, nr=nonreproductive
TimeObserved	dbDate	8	The time the animal was observed or captured
VoucherType	dbText	255	"Specimen" if one was collected. "Photo" if it's a photo voucher
CollectorName	dbText	255	The name of the collector or photographer
CollectionNumber	dbText	255	Collection number assigned to the specimen or photo voucher by the Collector/Photographer
NPSAccessionNum	dbText	255	Accession number assigned to the specimen by the National Park Service
NPSCatalogNum	dbText	255	Catalog number assigned to the specimen by the National Park Service
Specimen Repository	dbText	255	The physical location where the specimen is being stored
OtherAccessionNum	dbText	255	Other accession number assigned to the specimen (probably by the Specimen Repository if not NPS)

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443**

OtherCatalogNum	dbText	255	Other catalog number assigned to the specimen (probably by the Specimen Repository if not NPS)
SpecimenOrPhotoDescription	dbText	255	For specimens, give brief description (e.g., skin, skull) and preservation method (if applicable). For photos, give brief description of photo and what it portrays (e.g., captured individual, tail markings clearly visible)
SpecimenCondition	dbText	255	Specimen condition. COM=complete (100% of specimen present); INC=incomplete (<100%, >50%); FRG=fragment (<50%). EXC=excellent (no damage/deterioration(DD)); GD=good (minor DD); FR=fair (some DD); PR=poor (significant DD)
Identifier	dbText	255	The person who identified the animal
DataConversionComments	dbText	255	Comments related to converting data from source spreadsheet into MS Access 2000 tables.

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:****TABLE NAME:** tblPhotograph**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing some photo information from Bogan's 2001-2002 NCPN mammal inventory. Can use LocID field to try to link to tblLocationMammal.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 7

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
PhotoRefID	dbText	255	-no description-
LocID	dbText	255	If photo is taken at a GPS-ed location or trapline, enter the Location ID
Location Description (if no Location ID)	dbText	255	If photo is taken at a location that is not GPS-ed or does not otherwise correspond to a species location or trapline, give a general location description (including park name).
Photographer	dbText	255	-no description-
Photo Date	dbText	255	-no description-
Photo Description	dbText	255	-no description-
Voucher?	dbText	255	-no description-

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:****TABLE NAME:** tblPhotoLog**SPATIAL THEME:** N/A**DESCRIPTION:** Table containing information about general photos taken during Bogan's 2001-2002 NCPN mammal inventory. Not linked to other tables.**FORMAT:** Microsoft Access**NO. OF FIELDS:** 8

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
FileID	dbText	50	Name of scanned image file
ParkCode	dbText	4	Standard 4-letter Park code
PhotoRefID	dbText	255	ID number assigned by the photographer
Location ID	dbText	255	This field was not populated in the source data. "If photo is taken at a GPS-ed location or trapline, enter the Location ID"

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443**

Location Description	dbText	255	(if no Location ID) If photo is taken at a location that is not GPS-ed or does not otherwise correspond to a species location or trapline, give a general location description (including park name).
Photographer	dbText	25	Name of the person who took the photograph
Photo Date	dbDate	8	The date the photograph was taken
Photo Description	dbText	255	A description of the photograph

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:**

TABLE NAME: tblTraplineInfo

SPATIAL THEME: N/A

DESCRIPTION: A table derived from the source data. Attempts to provide coordinate data for trapline locations based upon info in source data. Is not a complete listing of all traplines, since couldn't determine all coordinate data for all traplines from source.

FORMAT: Microsoft Access

NO. OF FIELDS: 12

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
Park Code	dbText	4	Standard 2-letter Park code
Trapline Waypoints	dbText	255	Start and stop waypoint names from source data.
Comments	dbText	255	From source data "Observation Comments". Have values if comments were related to trapline info.
Sampling Method	dbText	255	Either general "trapline", or type of traps
Location Name	dbText	255	-no description-
Location Description	dbText	255	-no description-
Radius or Buffer (meters)	dbText	255	Not sure how this was used in source data
Start UTM E	dbDouble	8	Start X coordinate for trapline
Start UTM N	dbDouble	8	Start Y coordinate for trapline
Stop UTM E	dbDouble	8	Stop X coordinate for trapline
Stop UTM N	dbDouble	8	Stop Y coordinate for trapline
UTM Zone	dbText	255	UTM zone for coordinates

FILENAME: 2001-2002 MammalData.mdb**FILE DESCRIPTION:**

TABLE NAME: tluGeoRefSource

SPATIAL THEME: N/A

DESCRIPTION: Lookup table containing Geo-Referencing Sources (how coordinate data was derived).

FORMAT: Microsoft Access

NO. OF FIELDS: 1

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
GeoRefSource	dbText	50	Geo-referencing source. The source of the coordinates (ie. how were the coordinates derived). Note: "TRS" = Township/Range/Section.

Dataset Catalog Report: Mammal Inventory, 9 NCPN parks**RECORD ID: 443****FILENAME: 2001-2002 MammalData.mdb****FILE DESCRIPTION:**

TABLE NAME: tluLocationError

SPATIAL THEME: N/A

DESCRIPTION: Lookup table containing ranges of horizontal error for coordinate data.

FORMAT: Microsoft Access

NO. OF FIELDS: 3

<u>FIELD NAME</u>	<u>FIELD TYPE</u>	<u>FIELD WIDTH</u>	<u>FIELD DESCRIPTION</u>
LocErr	dbText	50	Location error. Estimate of horizontal accuracy of a coordinate.
BufferMeters	dbLong	4	Numerical buffer, in meters. The radius used to encircle a point with the given LocError value.
Comments	dbText	150	Comments regarding location error ranges.

Dataset Format: MS Access 2000 database**File Location:** NCPN server: X:\Archive\Project Archive\Completed Inventory Projects\2001-2002 NCPN Mammal Inventory\Final**File Size (MB):** 13**At Park?** No**Conversion?** No**Distrib. Cost:****Distribution:** I&M (Margaret Beer)**Online Link:****Comments:** entered by mp/NCPN I&M**Contact:****Beer, Margaret**

Northern Colorado Plateau Network Data Manager

c/o Colorado National Monument

Fruita

CO

81521

Phone: 970-858-3617 x321**FAX:****E-Mail:** Margaret_Beer@nps.gov

Appendix L. Summary of laws and policy related to the Freedom of Information Act

This appendix summarizes the laws and policy related to protected information about Park resources and the Freedom of Information Act (FOIA). It also describes the procedures for classifying and managing protected information from Inventory and Monitoring Program projects, as well as the procedures for responding to FOIA requests. Much of the material contained in this section is copied or derived from NPS Director's Order #66: Freedom of Information Act and the Protection of Exempted Information (Drafts 12-4-03 and 4-12-04).

1. Summary

The FOIA specifies a process through which all United States Government entities must respond to requests for information by any member of the public. FOIA and National Park Service policy require that NPS staff routinely make available information that is of interest to the public, including data regarding park resources and management. Resource information collected through the Northern Colorado Plateau Network (NCPN), whether by NPS staff or partners, is intended to be available not only to parks but also to the public, and the routine dissemination of resource information is an important component of the Inventory and Monitoring (I&M) Program.

However, information that could result in harm to resources may be withheld from public release. Four resource confidentiality laws and an Executive Order direct the NPS to protect information regarding the nature and location of certain sensitive park resources. One of these laws, the National Parks Omnibus Management Act, states that information that could result in harm to specific natural resources, including endangered or threatened species, may not be released to the public, and that records containing such information are exempted from release through FOIA.

Only a small subset of the information collected through NCPN is likely to be considered protected. Nevertheless, all data sets and associated information from network activities, including spatial data such as GIS files, should be assessed to determine sensitivity, and any protected information should be carefully managed to prevent its release. When publishing or posting resource information, or when responding to a FOIA request in collaboration with the regional FOIA officer, network staff should try to ensure that only the protected information is withheld and not associated non-sensitive information.

2. Definitions Relating to Management of Protected Information

Endangered or threatened National Park System resources. For natural resources, this indicates a species or population that has been formally designated as endangered, threatened, a species of concern, or proposed for such a designation by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, or a similar designation by an appropriate state agency. A parallel definition exists for cultural resources.

Partners are individuals or entities that enter into cooperative or collaborative relationships with NPS for the purpose of achieving overlapping goals, where at least some goal is held in common by both the partner and the NPS. This relationship is documented through a letter, VIP appointment, general agreement, permit, contract, or some similar written arrangement. Partners can include both private entities and other federal agencies.

Protected information indicates information about a sensitive park resource that must not be released to the public according to any of the four resource confidentiality laws and the Executive Order applicable to NPS.

Principal Investigator in this context means the person primarily responsible for the implementation of an inventory or monitoring project, whether that person is a partner, is affiliated with a partner institution, or is an NPS employee.

Record includes all books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics. Records are made or received by an agency of the United States Government under federal law or in connection with the transaction of public business and preserved by that agency as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government, or because of the informational value of the data in them (44 U.S.C. 3301).

Resource confidentiality laws refer specifically to the National Parks Omnibus Management Act (16 U.S.C. 5937), National Historic Preservation Act (16 U.S.C. 470w-3), Federal Cave Resources Protection Act (16 U.S.C. 4304) and Archaeological Resources Protection Act (16 U.S.C. 470hh).

Sensitive park resource indicates a park resource covered by the resource confidentiality laws that is considered susceptible to significant harm, theft or destruction, and about which information should be protected from public release.

3. Legal and Policy Framework for NPS Natural Resources Information Dissemination

3.1 Freedom of Information Act, 5 U.S.C. § 552

The Freedom of Information Act of 1966 (FOIA), amended in 1976 to provide guidance for electronic information distribution (the amendments are commonly referred to as EFOIA) applies to records that are owned or controlled by a federal agency, regardless of whether or not the federal government created the records. FOIA is a broad disclosure law intended to establish a right for any person to access federal agency records that are not protected from disclosure by exemptions. Under the terms of FOIA, agencies make some non-protected records generally available for inspection and copying in public reading rooms and via the Internet. Other records are provided in response to specific requests through a specified process. The Department of the Interior's revised FOIA regulations (43 CFR Part 2, Subparts A through E [see 67 FR 64527]) and the Department's Freedom of Information Act Handbook (383 DM 15) can be accessed at <http://www.doi.gov/foia/>.

3.2 National Parks Omnibus Management Act, Section 207, 16 U.S.C. § 5937

The National Parks Omnibus Management Act (NPOMA) prohibits the release, under FOIA, of information regarding the nature and specific location of certain cultural and natural resources in the National Park System. Information prohibited from release includes the location of endangered or threatened species—specifically maps or narrative descriptions indicating site specific locations. The law also identifies conditions under which the Secretary may release this information.

3.3 National Park Service Management Policies

The NPS Management Policies (2001) explain the dual goals of the National Park Service with regard to information on resources—to withhold information that will put particular resources at risk and to expeditiously release information that does not.

3.4 Director's Order #66 Freedom of Information Act and the Protection of Exempted Information (Drafts 12-04-03 and 4-12-04)

The final Order will function as a supplement to the Department of the Interior FOIA regulations. It is intended to clarify internal NPS operational questions and responsibilities regarding procedures, signature authority, security requirements, and the relationship of paper and electronic records to FOIA and EFOIA. Also, the final Order will specifically address records concerning the location and nature of specific types of park resources that are prohibited from disclosure by the resource confidentiality laws. The draft of the Order states “In general, any federal agency that holds information about the nature and specific location of park resources that qualifies as protected information under the provisions of NPOMA must withhold that information from the public unless the Director of the National Park Service or designee determines that its release would:

- 1) further the purposes of the unit of the National Park System in which the resource is located
- 2) not create an unreasonable risk of harm, theft, or destruction of the resource
- 3) be consistent with other applicable laws protecting the resource—the expected Order will be accompanied by Reference Manual 66 which will give more detail (refer also to NPOMA)

4. Public Access to Network Inventory and Monitoring Data

According to NPS Management Policies and Inventory and Monitoring Program goals, each network will make information on park resources readily available. In addition, the 1F6 amendments to FOIA require that all information that is regularly requested, except exempted records, must be made available to the public via reading rooms and the internet.

The five internet portals through which information from Northern Colorado Plateau Network projects will be made available to the public are listed in Table L.1.

Table L-1. Northern Colorado Plateau Network Internal Portals for Projects

Name	Description of Content	For More Information
Northern Colorado Plateau Network Web Site	Reports and other information on all Network projects as well as Network parks, operations and staff	http://www1.nature.nps.gov/im/units/ncpn/
NPSpecies	Information on species in the National Parks, including all records generated through the I&M Program	www.nature.nps.gov/im/apps/npspp/
NatureBib	Bibliographic references that refer to National Park System natural resources	http://www.nature.nps.gov/nrbib/index.htm
NR-GIS Metadata and Data Store	Documents, maps, and data sets containing resource information from all sources, and their associated metadata	http://science.nature.nps.gov/nrdata/docs/about.cfm
Biodiversity Data Store	Documents, GIS maps, and data sets that contribute to the knowledge of biodiversity in National Park units	http://science.nature.nps.gov/im/inventory/biology/

Both secure and public interfaces are maintained for each of the databases associated with these portals (the NatureBib interface is currently in development), and the public will have access to all information in these databases except those records marked as ‘sensitive.’

5. Classifying and Managing Protected Information

The procedures for classifying protected information and managing information about sensitive park resources can be summarized as follows:

- Network staff (Coordinator, Data Manager, and/or other designated staff) will ensure that all known potentially sensitive park resources are identified.
- Network staff will ensure that investigators working on network projects understand that (1) all data and associated information must be made available for review by network staff prior to public release in any format, and (2) that any information classified by the NPS as protected should not be released in any format except as specifically coordinated with the NPS (see section 9.2.5.2.2).
- Network staff will identify all known potentially sensitive park resources to the principal investigator for each project.
- All known references to potentially sensitive park resources that are generated from each project will be identified to the network by the principal investigator for that project.

- For each project, the network staff will provide a list of all references to potentially sensitive park resources in each park to the park resource manager for review.
- Each resource manager and/or superintendent determines which information should be protected.
- The network staff will ensure that all protected information is properly identified and marked before uploading into network or national databases, and before archiving the databases.
- Network staff will ensure that all references to protected information are removed or obscured in any reports, publications, maps, or other public forum. Following the standard for FOIA requests, the network will segregate the non-releasable information and where practical will not withhold associated releasable information.

5.1 Classifying Protected Information

The classification of protected natural resource information from Inventory and Monitoring Program activities will be done on a case-by-case, project-by-project basis. According to NPOMA, if the NPS determines that disclosure of information would be harmful, information may be withheld concerning the nature and specific location of:

- endangered, threatened, rare, or commercially valuable National Park System resources
- mineral or paleontologic objects
- objects of cultural patrimony

The Federal Cave Resources Protection Act (16 U.S.C. § 4304) similarly authorizes the withholding of information concerning the specific location of any significant caves.

The network will work closely with the investigators for each project to ensure that potentially sensitive park resources are identified and that information about these resources is tracked throughout the project. Network staff will be responsible for identifying all potentially sensitive resources to the principal investigator(s) working on each project. The investigators, whether NPS staff or partners, should develop procedures to flag all potentially sensitive resources in any products that come from the project, including documents, maps, databases and metadata. All records and other references to the potentially sensitive resources should be specifically identified by the investigator when submitting any products. Partners should not release any information before consulting with NPS staff to ensure that the information is not classified as protected. See section L.5.2.2.

Network staff should compile information about potentially sensitive resources from each project and forward it in the context in which it would be made available to the public (report, map, database etc.) to each appropriate park resource manager. Each resource manager and/or superintendent will determine whether or not to protect the information. For inventory reports, monitoring project reports, or other stand-alone documents, this process

will be most efficiently conducted as part of the final draft review for each document. For information contained in other formats that will not have a discrete review process, network staff will be responsible for flagging any potentially sensitive information and forwarding a request to the resource manager.

The following guidance for determining whether information should be protected is suggested in the draft Director's Order #66 (the final guidance may be contained in the Reference Manual 66):

- 1) Has harm, theft, or destruction occurred to a similar resource on federal, state, or private lands?
- 2) Has harm, theft, or destruction occurred to other types of resources of similar commercial value, cultural importance, rarity, or threatened or endangered status on federal, state, or private lands?
- 3) Is information about locations of the park resource in the park specific enough so that the park resource likely could be found at these locations at predictable times now or in the future?
- 4) Would information about the nature of the park resource that is otherwise not of concern permit finding the resource if the information were available in conjunction with other specific types or classes of information?
- 5) Even where relatively out-dated, is there information that would reveal locations or characteristics of the park resource such that the information could be used to find the park resource as it exists now or is likely to exist in the future?
- 6) Does NPS have the capacity to protect the park resource if the public knows its specific location?

In the Northern Colorado Plateau Network, most information that may qualify as protected will pertain to rare species of plants and animals, including federal and state-listed species. The information that may be protected could include the location, density or abundance, or presence/absence of the resources in question. Specific examples are maps, narrative descriptions, or monitoring plot locations indicating site specific locations of species.

Information that is already in the public domain can be released. For instance, the return of condors to the Grand Canyon has been well documented by the press. If parties request site-specific information about where the condors have been seen, this information can be released. However, specific nest site locations must not be released.

5.2 Managing Protected Information

5.2.1 General Procedures

Any information that a resource manager or superintendent determines should be protected will be removed by network staff, or by partners with network staff guidance, before publication or the posting of documents or other media in which the information is contained. Following the standard for FOIA requests, the network will segregate the non-releasable information and where practical will not withhold associated releasable information.

The method used to withhold protected information depends on the nature of the particular park resource and the medium in which the information is contained. It is the responsibility of network staff, with guidance from park superintendent(s), to determine the appropriate measures to withhold protected information. In the Northern Colorado Plateau Network, protected information is likely to refer to the presence or absence and location of rare species.

It may be appropriate to generalize location data in order to make an area large enough so that the public will be provided some information without learning the specific location of the park resource. This principle can be applied to text descriptions of locations, to text or coded data located on field data sheets or in databases, to GIS files, or to printed maps. In the case of databases, all references to any resource regarding which information is protected should be deleted or otherwise concealed in any publicly accessible version. For example, when providing location information, cutting off the last digits in UTM coordinates will make the location general enough in some cases. This could apply to metadata files associated with GIS data as well. An option for GIS-based displays or printed maps would be to increase the pixel size to the point that finding the object of interest is not possible.

Four of the databases for natural resource related information from the Inventory and Monitoring Program—NatureBib for bibliographic references, NPSpecies for species records, and the Biodiversity Data Store and NR-GIS Data and Metadata Store for documents, GIS maps, and data sets—are equipped with the capacity to mark protected information when records are being uploaded. All records that are marked ‘sensitive’ upon uploading will only be available through the secure applications. Thus, access to information on sensitive park resources will be limited to NPS staff or partners who have signed a confidentiality agreement. Procedures regarding the release of protected information can be provided along with access to the databases. It is critical that the Network implement quality control and quality assurance measures to ensure that anyone uploading records into these databases will know the procedures for identifying and entering protected information.

Precautions should be taken to avoid inadvertent releases of protected information. Examples of inadvertent releases are the use of protected information in the development of NPS interpretive and public information programs or the inclusion of protected information in National Environmental Policy Act documents.

5.2.2 Procedures for Working with Partners

Network staff must work with any partners that are collecting or reporting information from Inventory and Monitoring Program projects to ensure that:

- all of the records and other information associated with projects are submitted to the NPS
- protected information is identified as described in section L.5
- protected information is withheld from public release

- the NPS and the partner have a signed agreement including a confidentiality clause
- specific procedures for review of information that may be reported by partners are established (This consultation must occur before the partner releases potentially sensitive information to any outside party, whether as part of a publication, posted to a website, or pursuant to a FOIA request or any other request.)

5.2.2.1 Partner Agreements

The rights and responsibilities of the NPS and partners regarding potentially sensitive park resources should be stated clearly in any Cooperative Agreement, contract, Interagency Agreement, VIP agreement, or other written confirmation of a working relationship. Each agreement should address the following:

- Clarification of the ownership of data and associated information—the following text, adapted from guidelines developed by Acadia National Park, is recommended: “All associated data (including, but not limited to field notes, maps, slides, photographs, charts/graphs, tabular and GIS data with associated metadata) are required to be submitted to the Network annually and are owned by the National Park Service.”
- All known potentially sensitive park resources should be named. Since the agreement itself is a public document only the names of the resources should be provided, not specific information about their distribution or abundance, in case that information should be protected.
- The procedures for the classification of protected information should be summarized, especially with regard to cooperation between the Network staff and the project staff (as described in section L.5.1).
- A requirement for the partner to withhold protected information and to consult with the NPS before releasing any information on sensitive park resources should be stated. Thus, the document should include a confidentiality agreement.

If agreements do not contain specific responsibilities for the NPS and the partner regarding protected information, then Network staff must work with partners to institute the appropriate procedures. Note that Federal ownership of information means that the information is subject to public release through FOIA.

6. Responding to FOIA Requests

When a Network or a Network park receives a specific FOIA request for Inventory and Monitoring Program information, they will handle it according to standard Department of the Interior and NPS procedures, following the Department’s Regulations, the Department’s FOIA Handbook, and the NPS Directors Order #66 and Reference Manual 66. General information and web links regarding FOIA are located in section L.3.1.

The procedures for responding to FOIA requests for Inventory and Monitoring Program-related information can be summarized as follows:

- When a request is received by a park or the network, it is the responsibility of the NPS official recipient (the superintendent for a park, or the network Coordinator) to comply with FOIA. Notification of the request is forwarded to the regional FOIA program coordinator and the request is logged into the Electronic FOIA Tracking System.
- The request is 'perfected' (finalized) by estimating fees and determining the requestors payment limit or request for payment exemption; from this date the NPS has 20 days to respond.
- The requested records are compiled by the recipient office, noting any records that contain protected information and thus are exempted from release. The recipient must consult with the NPS solicitor regarding any exempted records.
- When a record contains both exempt and nonexempt material, a reasonable attempt should be made to segregate and release nonexempt information.
- A draft response to the request containing the requested records along with an explanation of any records that have been withheld should be submitted to the Regional FOIA Program Coordinator, then forwarded to the Regional FOIA Officer and finally to the Regional Director for signature and release.

6.1 Inquiries for Information and/or Records

Upon receipt of a request, the FOIA Officer will make a determination as to whether it is subject to FOIA (i.e., a request for records) or merely a request for information. If the requester seeks an answer to a specific question, or an explanation of policy, procedures, or a Departmental action, DOI is not required to process the request under FOIA. Nonetheless, the FOIA Officer should refer the request for information to the appropriate office for response in a timely manner.

6.2 Exemptions from Release of Records through FOIA

Nine exemptions and three special law enforcement record exclusions permit the withholding of sensitive or confidential information from release through FOIA. Although the NPS does not rely on any particular exemption, the one most likely to be used in the context of park natural resources requires withholding records that are prohibited from disclosure by another statute. Four resource confidentiality laws and one Executive Order direct the NPS to protect information regarding the nature and location of certain sensitive park resources. These include the Federal Cave Resources Protection Act and the National Parks Omnibus Management Act (NPOMA), which requires that information potentially harmful to particular natural resources, including listed endangered or threatened species, be withheld from public release.

In some instances, acknowledgement that a particular resource exists at all in a park may reveal too much information. In such cases, a response that neither confirms nor denies the existence of such records may be appropriate in reply to a FOIA request. Such a reply is known as a Glomar response.

6.3 Release of Records through FOIA for Projects with Partners

FOIA dictates that once an agency has shared records with any party outside the federal government without a pre-release agreement, it must make the records available to any and all other parties who request them. This provision is referred to as the “release to one, release to all” rule.

When published research findings are produced under a grant or other Federal assistance, including funding from the Inventory and Monitoring Program, and the findings are used by a bureau in developing an agency action that has the force and effect of law (e.g., a policy or regulation), the research data related to such findings are considered agency records even if they are in the possession of the recipient.

6.3.1 Procedures for Working with Federal Agency Partners

In general, any federal agency that holds information about the nature and specific location of park resources that qualifies as protected information under the provisions of NPOMA must withhold that information from the public unless the Director of the National Park Service or designee determines that its release would:

- 1) further the purposes of the unit of the National Park System
- 2) not create an unreasonable risk of harm, theft, or destruction of the resource
- 3) be consistent with other applicable laws protecting the resource

When another federal agency informs NPS that it has received a FOIA request regarding information that the other agency holds about park resources, NPS first assists the agency in determining whether the requested records fit within the definition of protected information. The agency must withhold the information pending action from the NPS. NPS will ask the agency to forward the FOIA request to the NPS with either: 1) a preliminary recommendation that the information be withheld; 2) a preliminary recommendation that it be released; or 3) a statement that the agency will not be making a recommendation whether the information should be released.

The NPS will make its determination about what information, if any, is to be withheld based on information the NPS receives from the agency, the requester, any other party that it consults, and its own inquiry into whether the information can be released under the provisions of NPOMA.

6.3.2 Requests for NPS Records Held by a State Agency or Partner

Before sharing information with state employees, whether from state agencies or state funded universities, NPS must be aware that those state employees may be obligated to release information in their possession to any party requesting it because state freedom of information or sunshine laws require such release. In states with Freedom of Information laws that allow the withholding of certain types of information, it may be possible that state employees would have the authority to enter into contractual agreements with NPS to withhold protected information. NPS must not share protected information with any state employee where state laws require the release of all information in state records.

6.3.3 Requests for Information Received by NPS from Non-NPS Entities

The NPS cannot guarantee confidentiality of information received from any non-NPS entity. Once NPS receives information from others, its treatment of the information is governed by FOIA. Such information must be released in response to a FOIA request if it does not qualify as protected information. The NPS must, however, withhold any information it receives that does qualify as protected.

Appendix M. NCPN Internet/Intranet Management

The National Park Service Inventory & Monitoring

NORTHERN COLORADO PLATEAU NETWORK

NCPN Internet/Intranet Website Management

Version 1.0

August 2005

Introduction

Included in the NCPN Data Management Plan for the integration and sharing data products is the development and maintenance of internet and intranet web sites.

The NCPN intranet and internet sites are managed using Macromedia Dreamweaver. ColdFusion MX is required to provide interactive functionality with Microsoft Access databases through Java Database Connectivity (JDBC), a standard SQL database access interface. Dreamweaver provides HTML and ColdFusion editing capabilities including a complete library of ColdFusion Markup Language (CFML) tags and editing tools.

Website Configuration

Both web sites reside on servers located at the WASO office in Fort Collins, Colorado. Access to these servers is gained using FTP through Dreamweaver, which provides check-out and check-in functionality. The internet and intranet sites reside on separate servers, with the intranet server blocking access to non-NPS IP addresses. Mirror images of the websites are maintained on the Web Administrator and backup Administrator PCs, with synchronicity maintained through Dreamweaver. Local ColdFusion servers are installed on each Administrator's PC to provide database access for testing purposes. The NCPN Web Administrator is the IT Specialist located at Colorado National Monument, Fruita, CO. The backup Administrator is the NCPN GIS Specialist located at the SEUG offices, Moab, UT.

Website Maintenance

To perform maintenance on a web object, the object is first checked out from the WASO server using Dreamweaver. This process places a lock on the object on the WASO server so that any attempt to check out the object by another Web Administrator generates an error message. Changes are then made to the object on the Administrator's local PC and testing is done. After testing is complete, the object is checked back in to the WASO server along with any necessary supporting objects (e.g., PDF files, executables, maps). This check-out check-in process prevents update conflicts between Administrators who may be located at different sites.

Directory Structure

Figure 1 shows the file structure of the NCPN internet site.

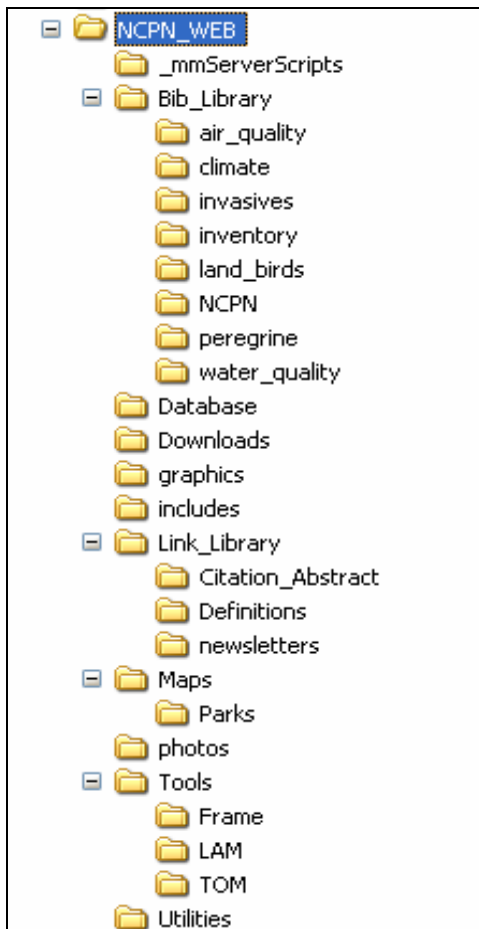


Figure 1. NCPN internet and intranet sites directory structure.

Root Directory

The root directory contains all the main pages of the site.

Bib Library

The Bib_Library directory holds reports, protocols, and related documents linked to the Data and Reports page. Subdirectories to the Bib_Library directory hold documents related to particular protocols (e.g., Climate, Peregrine, Air Quality). All files in the bib_library folder must have an entry in NatureBib, and the NatureBib bibkey serves as part of the file name.

Database

The Database directory holds Microsoft Access databases necessary for the function of interactive pages (e.g., Climate, Species List). These databases must be defined as data sources in ColdFusion Administrator.

Downloads

The Downloads directory is a work area for the filecopy.cfm page when it needs an intermediate storage area for downloading. It is currently used for downloading Species Lists in Excel format.

Graphics

The Graphics directory holds graphic objects that are included on various pages (e.g., gif, jpg).

Includes

The Includes directory contains files that are called by <cfinclude> tags. The CFML <cfinclude> tag is used to include one page in another, making code reuse easy.

Link Library

The Link_Library directory contains objects of explanation and definition for various pages in the site. These files do not have entries in NatureBib as opposed to files in Bib_Library which do. The Link_Library directory includes three subdirectories:

- **Citation_Abstract** – includes citations and abstracts for reports.
- **Definitions** – includes pop-up windows of definitions for the columns in the Species List.
- **Newsletters** – includes NCPN newsletters.

Maps

The Maps directory contains maps that are called by various pages. The **Parks** subdirectory contains maps of specific parks denoting climate stations for use by the ClimateParkMap.cfm page.

Photos

The Photos directory holds photographs for use by various pages (e.g., staff photographs).

Tools

The Tools directory contains models and interactive tools for use in developing sampling designs and to process, simulate, and display various types of data. The Tools directory includes three subdirectories:

- **Frame** – Sampling Frame Model, a model for the delineation of the population to survey as a finite list of non-overlapping elements.
- **LAM** – Landscape Access Model, a model that relies on GIS-derived raster layers of topography and transportation networks to determine accessibility and hiking distance from roads to each landscape cell.
- **TOM** – Transect Orientation Model, a model that relies on GIS-derived raster layers of slope and aspect to derive UTM coordinates of transect end-points given a centroid coordinate and parallel-to-contour transect orientation.

Utilities

The Utilities directory holds database utilities created by the NCPN for various data manipulation functions.

The NCPN intranet employs similar directory structure but includes only the Database, Graphics, Includes, Link_Library, and Photos directories.

Databases

Through the use of ColdFusion application server software, database connectivity is provided to enable the creation of dynamic, data-driven web pages on the NCPN sites. Data sources are defined in the ColdFusion Administrator, along with the proper driver. The NCPN uses Microsoft Access databases for its ColdFusion data sources. These databases reside in the Database directory.

Climate

The Climate database contains historical climate data for all weather stations in NCPN parks for input to the interactive climate graph application.

DCatSummary

The DCatSummary database holds dataset catalog data used in the Park Data Set pages.

Events

The Events database drives the Calendar application on the NCPN intranet site.

HitCount

The HitCount database stores hit counters for various pages on the NCPN internet site.

NCPN_Herps

The NCPN_Herps database contains certified species data for the Species List pages.

Page Organization

Pages on the NCPN sites are organized into major divisions accessed through the links on the page header bar that appears on each page. Figure 2 illustrates the layout of the NCPN internet site. On the internet heading bar, these links are:

Home

The NCPN internet home page.

About

The About section includes pages describing the objectives of the I&M network, network organization, staff, cooperators, and network parks. A page is provided for error/correction notification, through which users can submit notifications of errors which are routed by e-mail to the Network Administrator and backup Administrator. The page in question is reviewed and, if correction/modification is warranted, the necessary modification is made. The user who submitted the correction notification is then sent an e-mail advisement of the action taken.

Monitoring

The Monitoring page explains the development of monitoring protocols and provides links to all the current NCPN protocol pages.

Inventories

The Inventories page describes NCPN Inventory objectives and provides a link to a table of the current status of all NCPN projects and products.

Data & Reports

The Data & Reports page provides links to all NCPN electronic products. Links are present to all interactive database query pages (e.g., Species Lists, Park Data Sets), Analytical Tools (FRAME, LAM, and TOM), Data Management Tools, and Reports.

NCPN Intranet

A link to the NCPN intranet home page is functional for NPS users only.

Links on the NCPN intranet heading bar include:

Home

The NCPN intranet home page.

GIS

The GIS page describes the integration of GIS functions into the NCPN. It provides some basic park maps, links to National GIS sites, and a GIS request form to make special requests to the GIS department.

Naturebib

The Naturebib page includes a generic login, password, and link for the National Park Service Naturebib site.

Calendar

The NCPN Calendar allows the scheduling of events organized by the network or parks within the network.

Contact Us

Contact information for the NCPN staff.

NCPN Internet Home

This is a link to the NCPN internet home page.

Home Page: <http://www.nature.nps.gov/im/units/ncpn/index.cfm>

About: [/about.cfm](#)

Components and Timelines: [/components.cfm](#)

Cooperators: [/cooperators.cfm](#)

Network Map: [/map.cfm](#)

Network Parks: /ncpn.cfm
Organization: /structure.cfm
Staff: /staff.cfm
Contact Us: /Contact.cfm
Errors/Corrections Notification: /corrections.cfm
Monitoring: /monitoring.cfm
 Monitoring Protocols
Climate: /climateProto.cfm
Air Quality: /AirQualProto.cfm
Land Birds: /LandBirdProto.cfm
Peregrine Falcon: /PFalconProto.cfm
Protocol Development Summaries: /ProtoDevelop.cfm
Contact Us: /Contact.cfm
Errors/Corrections Notification: /corrections.cfm
Inventories: /Inventories.cfm
Inventory Study Plan: /Reports.cfm#ISPlan
Inventory Projects & Products: /InventoriesTable.cfm
Inventory Brochure:
http://science.nature.nps.gov/im/brochure/Inventories_Brochure.pdf
Contact Us: /Contact.cfm
Errors/Corrections Notification: /corrections.cfm
Data & Reports: /data.cfm
Park Data
Park Species Lists: /HerpSelect.cfm
About Park Species Lists: /SpeciesAbout.cfm
Park Species List: /herplist.cfm
Download in Excel Format: /SpeciesDownload.cfm
Park Data Sets: /DCatSelect.cfm
About Dataset Catalog: /DCatAbout.cfm
Dataset Catalog Summary: /DCatList.cfm
Dataset Catalog Details: /DCATDetails.cfm
NatureBib: <http://www1.nrintra.nps.gov/im/units/ncpn/NatureBib.cfm>
Climate Data: /ClimateMap.cfm
About Climate Charts: /ClimAbout.cfm
Select Climate Station: /ClimateParkMap.cfm
Select Climate Parameters: /ClimParam.cfm
Station Information: /ClimStationInfo.cfm
Climate Comparison - Select Date Parameters:
 /ClimDates.cfm
Directions for Use: /ChartHelp.cfm
Annual Chart: /ClimChartAnnual.cfm
Monthly Chart: /ClimChartMonth.cfm
Daily Chart: /ClimChart.cfm
Day Details: /ClimSiteDetail.cfm
Percentile Distribution - Select Date Parameters:
 /ClimPercentileDates.cfm
Directions for Use: /ChartHelp.cfm
Percentile Graph: /ClimChartPercentile.cfm
Percentile Distribution Chart:
 /ClimChartPercentBar.cfm
Avg/Max/Min Graph: /ClimChartMinMax.cfm
Max/Min Date Details: /ClimMaxMin.cfm
Analytical Tools: /ClimMaxMin.cfm
Reports: /Reports.cfm
Data Management Tools
Database Export: /Exportdb.htm

Directory List: /ListFiles.htm
Contact Us: /Contact.cfm
Errors/Corrections Notification: /corrections.cfm
NCPN Intranet: <http://www1.nrintra.nps.gov/im/units/ncpn/>

Figure 2. NCPN internet pages.

Adding Content

New content for web pages (e.g., text, reports, data sets, executables) are submitted to either the Web Administrator or backup Administrator for posting onto the appropriate page. Administrators will verify that all necessary supporting documentation is included (e.g., citations, abstracts, external links) and verify external links. Any NCPN employee may post events on the intranet event calendar, but if linked objects are needed (e.g., agendas, maps), the linked object must be submitted to an administrator.

Appendix N. Glossary of data management-related terms

Term	Definition
Almanac	A set of parameters used by a Global Positioning System (GPS) receiver to predict the approximate location of a navigation satellite and the expected offset of the satellite's clock. Each GPS satellite contains and transmits the almanac data for the entire satellite network. Almanac data must be acquired before GPS navigation can begin.
ANCS+	Automated National Cataloging System +. Database used by the National Park Service Museum Management Program for managing information about the objects and archives accessioned into NPS museum collections.
ArcGIS	A GIS software package developed by Environmental Systems Research Institute (ESRI) that includes ArcMap, ArcCatalog, and ArcToolbox as standard components. The National Park Service recommends that new GIS development take place in ArcGIS. ArcGIS also includes the geodatabase data model, which allows the management of attribute data in a relational database management system.
Arc/INFO	A GIS software package developed by ESRI that provides the tools for users to digitize, edit, access, visualize, query, analyze, and manipulate both geographic and tabular data.
ArcView	A desktop GIS software package developed by ESRI that allows users to visualize, explore, query and analyze spatial data spatially. Less expensive, less powerful, but easier to use than Arc/INFO.
ASCII	American Standard Code for Information Interchange. An international standard for the code numbers used by computers to represent all upper and lower-case Latin letters, numbers, punctuation, etc.
Base Station	A GPS receiver set up at a known location specifically to collect data for differentially correcting rover files. The base station calculates the error for each satellite and, through differential correction, improves the accuracy of GPS positions collected by a roving GPS receiver. Also called a reference station.
Coverage	An ArcInfo vector data storage format. A coverage stores the location, shape, and attributes of geographic features, and usually represents a single theme such as soil type, streams, roads or land use. Map features are stored as both primary features (e.g., arcs, polygons, and points) and secondary features (e.g., tics, links, and annotations). The attributes of geographic features are stored independently in feature attribute tables.
Data Dictionary (GPS)	A listing of the features and attributes relevant to a particular GPS project that is stored on a GPS unit and helps structure data collection. For each feature a list of attributes is presented from which selections can be made. Not all GPS units are capable of using data dictionaries.

Term	Definition
Datum	A mathematically derived reference point where the surface of the earth meets the ellipsoid model of the earth. Latitude and longitude lines on a paper map are referenced to a specific map datum. The map datum selected on a GPS receiver needs to match the datum listed on the corresponding paper map in order for the position readings to match. GPS receivers by default generate coordinates referenced to the WGS84 datum; the National Park Service standard is NAD83.
Differential Backup	A process where all computer files that have been modified since the last full backup of files are saved (see incremental backup).
Differential Correction	The merging of GPS rover file data with base station data to correct position errors due to various factors. This process reduces errors in field-collected data by correlating and correcting known errors recorded in base files that have the same time tag. As distance between the rover and base file increase, there is degradation in post-processed accuracy. In general, degradation of one part per million (1 ppm) occurs as the distance between the base station and rover file increases. For example, one millimeter of degradation occurs for every kilometer between the base station and rover file.
FGDC	Federal Geographic Data Committee. A 19-member interagency committee that develops policies, standards, and procedures for to cooperatively produce, document, and share geographic data. (www.fgdc.gov/index.html)
Geodatabase	A collection of spatial feature data sets in which all spatial, topological, and attribute data are stored in tables in a relational database. The geodatabase data model is a component of ArcGIS software.
Geographic Information System (GIS)	A collection of computer hardware, software, and geographic data for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically-referenced information.
Global Positioning System (GPS)	A constellation of a minimum of 24 satellite vehicles orbiting the earth approximately every twelve hours. GPS satellites transmit radio signals that allow the accurate determination of GPS receiver locations. GPS is used in air, land and sea navigation, mapping, surveying and other applications where precise positioning is necessary.
Incremental Backup	A process where all computer files that have been modified since the last full backup or the last incremental backup are saved (see differential backup)
Julian Date	Day of the year between the range of 1 and 365. For example, the Julian Date for February 2 is #33. February 2 is the calendar date.
Long-term Data Set	A data set that spans more than three years and for which data continue to be collected.
Mapping Grade GPS	GPS receivers capable of attaining five meters of accuracy or better using differential correction.
Metadata	Data about the content, quality, condition, and other characteristics of data. Usually comes in the form of a text or html document with information on the dataset's quality, current projection, attributes, distribution and citation.

Term	Definition
Monitoring Protocol	A formal document that describes how a vital sign will be monitored. It comprises a narrative section, standard operating procedures, and supplemental information (databases, reports, tools, hardcopy materials). A Monitoring Protocol is a component of a vital sign monitoring study plan.
Percentage Dilution of Precision (PDOP)	The combination of error factors caused by poor satellite geometry that can alter GPS position and time data. If satellites are not properly spaced, the horizontal position is degraded and PDOP values increase. PDOPs higher than 6.0 can cause approximately 1 meter of inaccuracy.
Post Processing (GPS)	The use of base station data, GPS software, and data acquired by a GPS receiver in the field to gain an accurate fixed position.
Precision	The degree of refinement with which an operation is performed or a measurement stated.
Protocol	A defined set of procedures and processes followed in a project.
RAID	Redundant Array of Independent Disks. A method of using several hard disk drives in an array to provide fault-tolerance in the event that one or more drives fail catastrophically.
Recreational-grade (GPS)	GPS receivers used primarily for the collection of waypoints, with an accuracy of less than 40 meters. These units do not have post-processing or filtering capabilities.
Rover File	Any file created by a mobile GPS receiver collecting data during a field session. The receiver's position can be computed relative to a stationary GPS receiver (see Base Station).
Shapefile	A vector file format for storing the location, shape, and attributes of geographic features stored in a set of related files and containing one feature class. Shapefiles are created and managed using ArcView software.
Short-term Data Set	A data set that encompasses fewer than three years of data collection.
Spatial Data	Information that identifies the geographic location and characteristics of natural or constructed features and/or boundaries on the earth.
Standard Operating Procedure (SOP)	Detailed instructions for carrying out sampling, data management and reporting procedures related to Monitoring Protocols
TIFF	Tagged Image File Format. A lossless uncompressed image file format commonly used for digital scanned images. Images saved in TIFF format can be used on most computers.
Vital Signs	Selected physical, chemical, and biological elements and processes of park ecosystems that represent the overall health or condition of a park.
Waypoint	A navigational fix as defined by a GPS unit; usually a destination or point of reference (location) along a route.